Brown Bear
Management Report
of survey-inventory activities
1 July 2000–30 June 2002

Carole Healy, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation
December 2003

ADF&G

Please note that population and harvest data in this report are estimates and may be refined at a later date.

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If used in part, the reference would include the author's name, unit number, and page numbers. Authors' names and the reference for using part of this report can be found at the end of each unit narrative.

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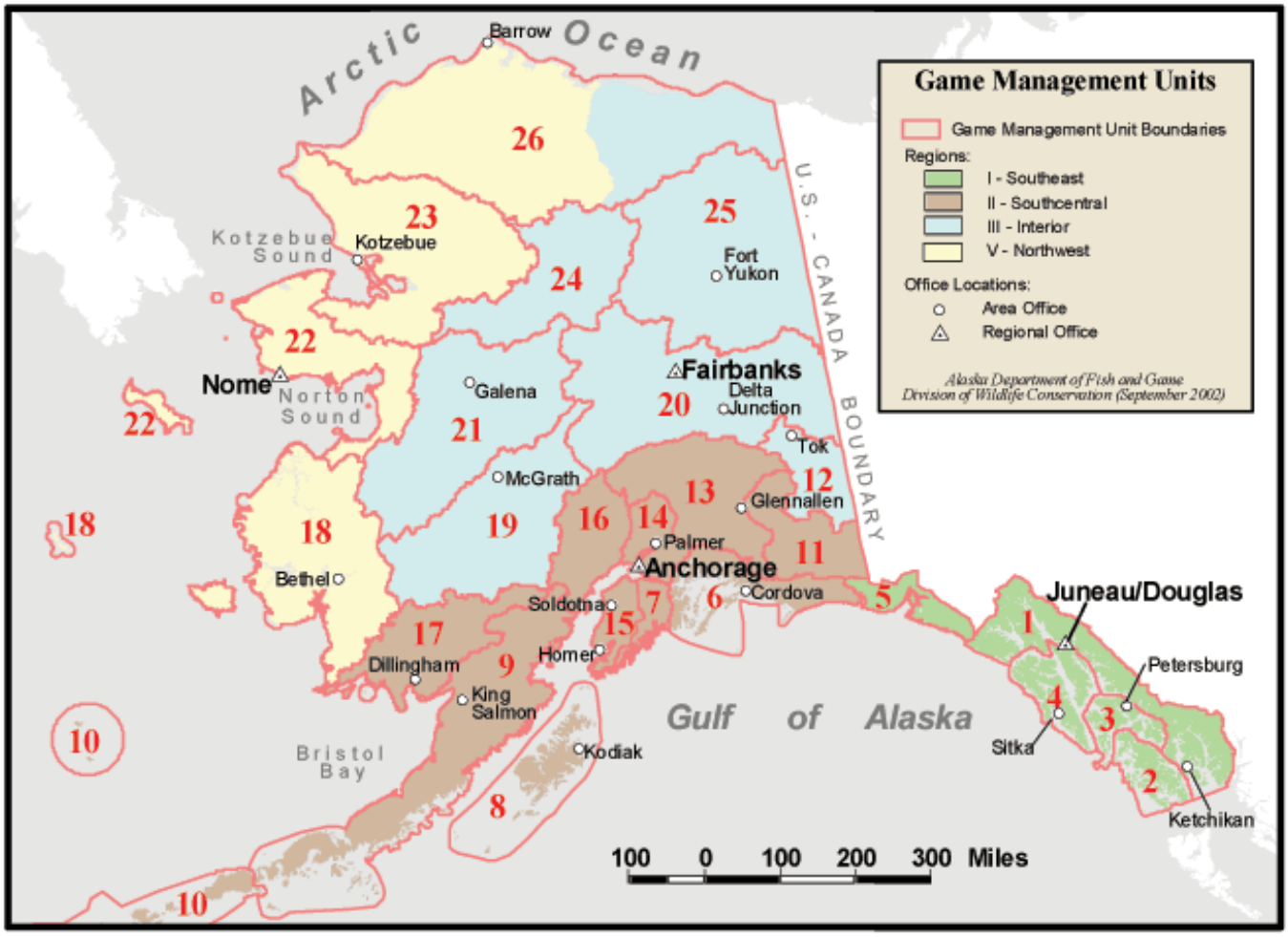
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 18 (42,000 mi^2)

GEOGRAPHIC DESCRIPTION: Yukon-Kuskokwim Delta

BACKGROUND

Brown bears exist at moderate density and the population is stable in Unit 18. Highest densities are in the Kilbuck Mountains southeast of Bethel and in the Andreafsky Mountains/Nulato Hills north of the Yukon River. Typically, few bears are reported as harvested.

Traditionally, bears were important as food animals for the Yup'ik Eskimo people of Unit 18 and some of their customs surrounding bear hunting were inconsistent with the general hunting regulations. A brown bear working group made up of representatives of Unit 18 villages was established as a vehicle for local input on brown bear issues. After consultation with this group, the Western Alaska Brown Bear Management Area (WABBMA) was established and regulations were modified to more closely match local cultural needs and to improve harvest reporting. In the WABBMA, a registration permit hunt is administered for subsistence hunters who pursue bears primarily for the meat.

In 1993, a brown bear population study in the Kilbuck Mountains was initiated in response to the creation of more liberal federal hunting regulations. Obtaining a brown bear density estimate in Unit 18 was an objective of this study that will not be achieved because of local sentiment against the use of radiocollars. However, our understanding of this bear population has grown and the need for a population estimate is now less acute. We are completing the study and plan to remove radiocollars during the spring of 2003.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain a viable brown bear population in Unit 18.
- Obtain brown bear population and harvest information.
- Minimize adverse interactions between bears and the public.
- Maintain productive working relationships with local residents and other agencies.

MANAGEMENT OBJECTIVES

- Coordinate with FWS biologists from the Yukon Delta National Wildlife Refuge (YDNWR) and the Togiak National Wildlife Refuge (TNWR) to implement and finalize a study that was designed to estimate the brown bear densities using mark-recapture techniques and record other population parameters in Unit 18.

- Monitor harvests through the sealing program, WABBMA registration permit reports, and contacts with the public.

- Provide educational material through the media and informal channels to improve compliance with brown bear hunting regulations and harvest reporting requirements.

- Inform the public of methods to minimize bear-human conflicts by reducing the attractiveness of fish camps, dumps, and other attractive nuisances.

- Communicate and cooperate with the Association of Village Council Presidents (AVCP), subsistence brown bear hunters, local village councils, and USFWS to regulate subsistence bear hunting, and develop techniques acceptable to local residents to monitor grizzly bear populations consistent with the cooperative management plan.

METHODS

Since 1993, we have continued the cooperative project with FWS and the Bureau of Land Management (BLM) to study brown bear density, movements, and population parameters. Methods used in this effort are described in the summary of capture-recapture techniques for bears developed by Miller *et al*. (1987).

Progress obtaining a brown bear density estimate has been stymied because the working group has not supported the deployment of radiocollars, particularly on boars, required by the census technique. Their support was made mandatory after a 1994 federal court decision put a halt to the use of radiocollars on brown bears in the Kilbuck Mountains. We maintained radiocollars on up to 29 female bears during this reporting period and contributed to a paper detailing this project.

During the 2000–2001 and the 2001–2002 regulatory years, we sent letters requesting harvest and effort information to registered hunters in the WABBMA and monitored the general hunt harvest through our standard sealing requirements. Several local residents shot bears in defense of life and property (DLP) and we assisted them through the administrative process.

In an effort to minimize bear-human conflicts at fish camps and village dumps, we contacted village leaders, local media, village natural resource personnel, hunters, and law enforcement personnel and relayed reports of illegal activities to the Department of Public Safety, Division of Fish and Wildlife Protection.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The bear population appears stable, although statistically valid bear density estimates have not been made in Unit 18. Density estimates are possible using a modified capture-recapture technique (Miller *et al*. 1987). However, for an accurate, statistically valid estimate, approximately 50% of the population must be marked, which is not feasible because of local opposition to radiocollaring. However, experience within the study area provides a basis for us to estimate that there are approximately 335 bears in the Kilbuck Mountains, 200 bears in the Andreafsky Mountains and 535 bears in Unit 18.

Kovach et al. (unpublished draft) found generally low reproductive parameters probably indicating that the bear population in the Kilbuck Mountains is near carrying capacity. These parameters were:

■ age of first reproduction	7.2 years
■ age of first successful reproduction	9.0 years
■ mean litter size for cubs of the year (COY)	1.98
■ mean litter size at weaning	1.62
■ mean age at weaning	3.00 years
■ reproductive interval	4.6 years
■ mean annual sow productivity	0.35 cubs weaned per year
■ survival rate of cubs from birth to weaning from 1993 to 2000	32.4% (34 weaned of 105 cubs produced)
■ mean annual survival rate for adult females from 1993 to 2000	95.0%

Population Composition

There were no activities to determine brown bear population composition in Unit 18 during the reporting period.

Distribution and Movements

Drainages that include salmon streams in Unit 18, such as the Kisaralik and Kwethluk Rivers in the Kilbuck Mountains and the Andreafsky River north of St. Marys, support greater brown bear densities than elsewhere in the unit. Lowland habitats along the forested riparian corridors of the Yukon River and tributaries of the Kuskokwim River support moderate densities of brown bears. Other lowland habitats, including the vast treeless lowland of the Yukon–Kuskokwim Delta (Y-K Delta), contain very few bears.

Home range of female brown bears in the Kilbuck Mountains ranged from 408 km^2 to 549 km^2 (Kovach et al. unpublished draft). We do not have home range information for male bears.

MORTALITY

Harvest

Season and Bag Limit.

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 18–General Hunt		
Resident Hunters: 1 bear every four regulatory years	10 Sep–10 Oct 10 Apr–25 May (General hunt only)	
Nonresident Hunters: 1 bear every four regulatory years		10 Sep–10 Oct 10 May–25 May (General hunt only)
Unit 18–Subsistence Hunt		
Resident Hunters: 1 bear per regulatory year by registration permit in the WABBMA for subsistence purposes	1 Sep–31 May (Subsistence hunt only)	
Nonresident Hunters:		No open season (Subsistence hunt only)

Board of Game Actions and Emergency Orders. In the fall 2001 meeting, Board of Game members extended the general brown bear resident and nonresident season to Sept. 1–May 31 for that portion of Unit 18, north of the south bank of the Kashunuk River, including its sloughs from its mouth to the Yukon River, and north of the south bank of the Yukon River, including its sloughs. This season will take effect during the 2002–2003 regulatory year. The Board of Game also reauthorized the brown bear tag fee exemption associated with the WABBMA registration permit.

Human-Induced Harvest. During the 2000–2001 regulatory year, the Unit 18 reported harvest was 6 bears (1 subsistence and 5 general season) and during 2001–2002 the reported harvest was 9 bears (1 subsistence and 8 general season). Nearly all of the total reported harvest occurs in the area south of the Kuskokwim River; only 2 of 47 bears harvested since 1994 were taken north of the Yukon River. Additional harvest statistics for the general hunt are shown in Table 1.

DLP losses are reported infrequently. By their nature, DLP instances are unplanned; people involved in DLP kills are unprepared for dealing with a dead bear, and generally have poor knowledge of proper procedures. We made some progress with DLP reporting, but we probably don't hear about many of the bears killed under DLP circumstances. During this reporting period we processed 2 DLP bears in 2000–2001 and 4 in 2001–2002. All of the reported DLP bears were taken along the Yukon River.

Permit Hunts. The WABBMA registration permit is available to hunters who take bears primarily for the meat. This permit was designed to make bear hunting regulations more suitable for local residents who include bear meat as part of their subsistence fare. Under this permit; hunters must salvage the meat for human consumption, the bag limit is one bear per regulatory year, the season is longer, the hide and skull need not be salvaged, hunters must report their hunting activity after receiving a prompt by mail, and the sealing requirement is eliminated unless the hide is removed from the management area. If a hide is presented for sealing under this last provision, the trophy value is destroyed by removing the skin of the head and the front claws and these parts are retained by the department. Harvest statistics for the subsistence hunt are shown in Table 2.

In some cases, hunters get the WABBMA registration permit so they can shoot a bear causing problems in camp during hunts for other big game. They often don't want to shoot a bear, but if they have to, they also don't care to relinquish it to the State as required by DLP regulations. Provided the meat is salvaged, the WABBMA registration permit offers them a way to do that without paying the $25 tag fee required under the general hunt regulations. In portions of the WABBMA, this is an accepted practice.

Hunter Residency and Success. During the 2000–2001 regulatory year, all 5 brown bears harvested under general hunting regulations were taken by nonresidents. During 2001–2002, 1 resident and 7 nonresidents harvested bears (Table 1). Because nonresidents aren’t eligible to hunt under the WABBMA permit, all of the bears taken under this permit were taken by residents (Table 2).

General hunt regulations require hunters to report by having their bear sealed. However, this reporting mechanism does not measure the number of unsuccessful hunters, so success rates could not be calculated for this group of hunters.

Success rates are available for those hunters using the WABBMA permits (Table 2). In 2000–2001, 11% of hunters who reported were successful. In 2001–2002, 16% of them were successful.

Harvest Chronology. Most of the bears taken in Unit 18 are killed in the spring with the largest part taken on or before May 15. However, this pattern is variable and it did not hold during 2001–2002 because poor snow conditions did not allow travel by snowmachine, which generally provides hunters greater access. Additional harvest chronology data are found in Table 1.

Transport Methods. All 5 successful hunters in 2000–2001 used airplanes, and 7 of 8 successful hunters in 2001–2002 used airplanes. The only hunter to use a boat was also the only resident to harvest a bear in Unit 18 under the general hunting regulations.

The hunters who use WABBMA permits typically use snowmachines. Since the subsistence season is open from 1 September through 31 May, snowmachines are more practical.

Other Mortality

During this reporting period, one bear was killed illegally in July 2000 and reported to us by the Alaska Dept. of Public Safety, Division of Fish and Wildlife Protection (FWP). During the previous reporting period, 6 radiocollared bears died of causes unrelated to hunting. The most likely causes of death were: 1 caught in an avalanche, 1 died of old age, and as many as 4 died during fights with other bears, possibly while defending cubs.

HABITAT

Assessment

Unit 18 contains approximately 14,000 km^2 of fair-to-excellent brown bear habitat in the Kilbuck and Andreafsky Mountains. Additional lowland riparian habitats surrounded by tundra, support moderate densities of brown bears along the Yukon River and tributaries of the Kuskokwim. Most brown bear habitat in Unit 18 is protected by the YDNWR and the TNWR, and land status is not expected to change.

Enhancement

Bear habitat is largely intact in Unit 18 and protected by the YDNWR and the TNWR. No enhancement is necessary or anticipated.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The WABBMA working group has been a useful platform for public involvement in bear issues in Unit 18. It was established to bridge the communication gap made apparent by the 1994 lawsuit that brought an end to the Kilbuck Mountains bear census. Through our participation in the brown bear study, our understanding of the bear population has grown and reasonable

estimates can be made about the size of the bear population. It is clear that the 1-bear-per-season bag limit established for the WABBMA permit hunt is sustainable and the need to complete a census is no longer acute.

While the working group still provides valuable input regarding bear issues in Unit 18, future meetings will be less frequent largely because funding to maintain the group has become more difficult to justify.

CONCLUSIONS AND RECOMMENDATIONS

The lack of objective bear population data hampered management in the past but now the need for this data is less acute because of the results of the Kilbuck Mountains brown bear study. Our understanding of this bear population includes reproductive parameters, reasonable estimates of population size, and the effect harvest on the population. Given our improved understanding, the objections of local residents to radiocollaring bears, and the fact that this population has endured a decade of harvest with no ill effects under the more liberal regulations that prompted the Kilbuck Mountains brown bear study, it is appropriate to conclude this project and remove the radiocollars during the spring of 2003.

The WABBMA working group was instrumental in providing a forum for public discussion of brown bear issues. Now that the study is scheduled to conclude, it is unlikely that additional meetings will be funded and the future of this working group is in limbo. If future meetings are not possible, we recommend that managers continue to solicit public comment through the working group chairs and the local Fish and Game Advisory Committees regarding brown bear management in Unit 18.

Nonresident hunters are required to hire a guide to hunt brown bears. The YDNWR has issued permits to 2 bear hunting guides to operate within the refuge and the TNWR has issued a permit to 1 guide to operate within the portion of the TNWR within Unit 18. Only 1 of these three guides is active in Unit 18 but each is permitted to take up to 5 bears per calendar year and there are no plans by either refuge to change that number. Because of this cap on the number of guides we expect nonresident brown bear harvest to remain low.

Inaccurate and incomplete data continue to be a problem. We should continue to encourage local residents to report all bear kills and we should continue efforts to develop reliable brown bear harvest and DLP information.

LITERATURE CITED

KOVACH S., G.H. COLLINS, J.W. DENTON, D. FISHER, M.T. HINKES, R.H. KACYON, S.D. MILLER, V.G. MILLER, J.R. MORGART, R.J. SEAVOY, L.J. VANDAELE, J.D. WOOLINGTON. (Unpublished draft) Brown bear density, movements, and population parameters in the southwestern Kuskokwim Mountains, Alaska 1996–2000. Progress report.

MILLER S.D., E.F. BECKER, AND W.B. BALLARD. 1987. Black and brown bear density estimates using modified capture-recapture techniques in Alaska. International Conference on Bear Research and Management. 7:23–25.

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Seavoy, R. 2003. Unit 18 brown bear management report. Pages 185–194 *in* C. Healy, editor. Brown bear management report of survey and inventory activities 1 July 2000–30 June 2002. Alaska Department of Fish and Game. Juneau, Alaska.

Table 1 Unit 18 general hunting season brown bear harvest. (M=male, F=female) RY 1994–2001
Season dates are 10 Sept.–10 Oct. and 10 May–25 May.

		Southeast of the Kuskokwim				North of the Yukon			
		Fall harvest		Spring harvest		Fall harvest		Spring harvest	
Regulatory year	Total harvest	Before 20-Sep	After 20-Sep	Before 15-May	After 15-May	Before 20-Sep	After 20-Sep	Before 15-May	After 15-May
1994–1995	3			M'F'	M'				
1995–1996	4		F'M	F'	M'				
1996–1997	5	M'		F'M'M	M'				
1997–1998	4		MM'F'		M				
1998–1999	13	M'F'M'F'	M'	FM'M' M'M'M'		M	F		
1999–2000	5	M	F'	M'	MM'				
2000–2001	5	F'		M'F'M'M'					
2001–2002	8	M'FM'	F'F'		M'M'F'				
Totals	47	10	9	17	9	1	1		

'Nonresident guided hunter

Table 2 Western Alaska Brown Bear Management Area (WABBMA) brown bear harvest, hunter effort and success, RY 1996–2001.

Regulatory year	Permits issued	Permits returned	Number Hunting	Bears harvested in WABBMA	Bears harvested in Unit 18
1996–1997	57	28	12	0	0
1997–1998	54	16	6	0	0
1998–1999	95	42	21	4	1
1999–2000	85	63	27	8	2
2000–2001	26	20	9	1	1
2001–2002	69	56	19	3	1

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 19, 21A and 21E (59,756 mi^2)

GEOGRAPHIC DESCRIPTION: All drainages of the Kuskokwim River upstream from the village of Lower Kalskag; Yukon River drainage from Paimiut upstream to, but not including, the Blackburn Creek drainage; the entire Innoko River drainage; and the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers.

BACKGROUND

Although grizzly bears are distributed throughout Units 19, 21A, and 21E, bear densities and hunter interest varies among subunits. At higher elevations within the Alaska Range and associated foothills (Units 19B and 19C), there is moderate harvest pressure, mainly from nonresident guided hunters. Harvest pressure is generally light in other portions of the units.

Estimated population densities were based on extrapolations from research in other areas. Harvests have generally fluctuated with season lengths and probably do not provide a good indication of population status or trend. During the 1960s when mandatory sealing requirements began, harvest was light, averaging about 15 bears annually. During the 1970s, harvest increased dramatically, but seasons were shortened severely and as a result harvest declined by the early 1980s. Throughout the 1980s, harvests remained relatively low, with a slowly increasing trend until the late 1990s.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

That portion of Units 19D and 19A north of the Kuskokwim River and Units 21A and 21E

- Provide the greatest sustained opportunity to hunt brown bears.

Unit 19C

- Provide an opportunity to hunt brown bears under aesthetically pleasing conditions.

Units 19A and 19B south of the Kuskokwim River and upstream from the Aniak River drainage

- Provide the opportunity to take large brown bears.
- Provide the opportunity to hunt brown bears under aesthetically pleasing conditions.

Western portion of Units 19, 21A within the Western Alaska Brown Bear Management Area, and 21E

- Provide for subsistence uses of brown bears.

MANAGEMENT OBJECTIVES

- Manage brown bear populations to sustain a mean annual harvest of no more than 70 bears with a minimum of 50% males in the harvest.
- Allow an increased legal harvest of brown bears in and around villages, fish camps, and other human habitations during open seasons to reduce human–bear conflicts during closed seasons.
- Increase reporting of harvest.

METHODS

Data from sealing certificates provided hunter residency and hunting methods, bear demographics, sex ratio of the harvest, and timing and location of harvest. Similar harvest data were compiled from registration permits for bears taken under Western Alaska Brown Bear Management Area regulations. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY01 = 1 Jul 2001 through 30 Jun 2002).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Composition

Population surveys or density estimates have not been conducted in these units. However, I estimated the population based on known bear densities (Miller et al. 1997) in similar habitats in other game management units in Interior Alaska. The habitat in Unit 19A is of moderate quality, which should support a density of 20 bears/1000 mi^2, or 200 bears. Unit 19B contains about 7500 mi^2 of good quality bear habitat, with an estimated density of 40 bears/1000 mi^2 or 300 bears. Unit 19C has about 5200 mi^2 of good habitat (40 bears/1000 mi^2 = 210 bears) and about 1500 mi^2 of moderate-quality habitat (20 bears/1000 mi^2 = 30 bears). Unit 19D generally contains poor quality habitat (15 bears/1000 mi^2 = 190 bears). Using these figures, my estimate was 950–1100 bears for Unit 19. Pegau (1987) estimated a total of 900 bears for the same area.

I used the same approach to estimate population size in Units 21A and 21E. The higher elevation areas are moderately good bear habitat, and low elevation areas contain poor

habitat. I estimated density at 25 bears/1000 mi^2 in moderately good bear habitat and 10 bears/1000 mi^2 in poor habitat. In Unit 21A there are about 4500 mi^2 of moderately good habitat (25 bears/1000 mi^2 = 113 bears) and about 11,500 mi^2 of poor habitat (15 bears/1000 mi^2 = 175 bears). The total population estimate for Unit 21A was therefore 285–335 bears. Unit 21E consists of about 1000 mi^2 of moderately good habitat (25 bear/1000mi^2 = 25 bears) and about 7000 mi^2 of poor habitat (15 bear/1000 mi^2 = 105 bears). The total population estimate for Unit 21E was 100–200 bears.

My estimate for the entire 60,352-mi^2 area was 1375–1650 bears, based on extrapolated densities of 15–40 bears/1000 mi^2. The population was probably stable or slowly increasing during the past 10 years, based on field observations, nuisance reports, hunter harvest and sightings.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 19A and 19B within the Western Brown Bear Management Area.		
One bear every regulatory year by registration permit.	1 Sep–31 May (Subsistence hunt only)	No open season
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 19A outside the Western Brown Bear Management Area.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 19B outside the Western Brown Bear Management Area.		
One bear every 4 regulatory years.	1 Sep–25 May	1 Sep–25 May
Units 19C, and 19D.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Units 21A and 21E.		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May

Alaska Board of Game Actions and Emergency Orders. The board passed a proposal at their March 2000 meeting to lengthen the Unit 19B season by 10 days in the fall and 6 days in the

spring. This resulted in the season beginning on 1 September instead of 10 September and ending on 31 May instead of 25 May. The Board of Game reauthorized the resident tag fee exemption for Unit 19D at their spring 2001 and 2002 meetings. Resident tag fee exemptions must be reauthorized each year by the board. At the March 2002 meeting the board passed a proposal that changed the bag limit in Unit 19C from 1 bear/4 years to 1 bear/year, which does not count against the bag limits of 1 bear/4 years in other units.

Hunter Harvest. Harvest of grizzly bears was highly variable between units (Table 1). During RY99–RY01, harvest trend for most of the area was stable, however the Unit 19B harvest increased substantially. The Unit 19A average harvest during RY92–RY95 was 7.5 bears/year. During RY96-RY99 it increased to 9.5 bears/year and during RY00–RY01 increased further to 10.5 bears/year. In Unit 19B harvest remained stable; during RY92–RY95 it was 27.3 bears/year and during RY96–RY99 harvest averaged 28.8 bears/year. Harvests increased during RY00–RY01 to an average of 50.5 bears/year. In Unit 19C the average harvest during RY92–RY95 was 15.8 bears/year. Harvest increased during RY96–RY99 to 22.8 bears/year but during RY00–RY01 decreased to 16.5 bears/year. In Unit 19D, annual harvest was either stable or inconsequential; during RY92–RY95 it averaged 2.3 bears/year compared to the RY96–RY99 mean harvest of 3.0 bears/year. During RY00–RY01 the average harvest increased to 6.0 bears/year. Unit 21A and 21E harvests have remained low since RY92, with Unit 21A averaging 1.7 bears/year. Unit 21E annual harvest increased from the RY92–RY95 level of 3.8 bears/year but remained stable at 7.0 bears/year during both the RY96–RY99 and RY00–RY01 period. The unreported harvest of bears taken at fish camps was probably ≤10 bears/year.

The 5-year mean annual harvest (RY97–RY01) in the entire area was 86.2 grizzly bears, an increase of more than 16 bears/year compared to RY95–RY99. The conservative estimate of sustainable harvest was 83–99 bears (6% of 1375–1650 bears; Reynolds 1997). The 5-year average annual harvests are now slightly more than the lower limit of the conservative sustainable levels based on the current population estimates.

Generally, the proportion of males in the reported harvest has been near 65% (Table 2). It was <50% (44%) during only 1 of the past 10 seasons (spring 1997). The mean percentage of males in the harvest during RY97–RY01 was 66% and varied from a low of 61% (RY99) to a high of 69% (RY00).

Generally, we assume that a preponderance of males in the harvest reflects a healthy population, given low-to-moderate hunting pressures. However, many Unit 19, 21A, and 21E grizzly bears are harvested on multi-species hunts, and hunters are not necessarily attempting to take a record-class animal. Therefore, hunters may not avoid taking females (except those with cubs or yearlings). Unless grizzly bear hunting effort becomes more intensive, our management objective to harvest >50% males should afford the protection needed to sustain the population, even if harvest levels exceed the guideline of 6% annual harvest of the estimated population.

Hunter Residency and Success. During the past 5 years, nonresidents harvested 354 of 430 bears (82%; Table 3). This indicates a relatively high use of the area by brown bear guides and their nonresident clients. No information is available on success rates (i.e., number

successful versus unsuccessful) for brown bear hunters in the unit. However, between RY93 and RY01, the mean number of days hunted annually by successful hunters fluctuated between 4.4 and 6.0 days.

Harvest Chronology. Most harvest occurred during fall season (Table 4). The fall harvest was greater primarily due to guided hunts for multiple species. Guided hunters opportunistically killed bears while hunting ungulates. Spring brown bear hunting increased in this area from an average of 12.5 bears during April and May RY93–RY96 to 17 bears during April and May RY97–RY99 and 22.5 bears during April and May RY00–RY01.

Transport Methods. During the past 5 years, 73–88% of successful hunters used airplanes as their primary access method (Table 5). The proportion of hunters using aircraft has not changed substantially since sealing began.

CONCLUSIONS AND RECOMMENDATIONS

Harvests during this reporting period were stable in Units 19A, 19C, 21A and 21E and increased in Units 19B and 19D. The harvest increased in Unit 19B from an average of 24 bears per year during RY94–RY97 to 44 bears/years during RY98–RY01. During RY01 the reported harvest was 55 bears, the highest recorded harvest in Unit 19B. This increase in harvest may be influenced by 1) the addition of 16 days to the season in RY01, 2) increased interest in brown bear hunting by guides due to local declines in the moose populations, and 3) bear populations that may be growing and therefore afford more hunters the opportunity to see and harvest bears. Close monitoring and further investigation of data to address these possibilities should be undertaken during the next reporting period. The harvest in Unit 19D doubled from 3 bears/year during RY96–RY99 to 6 bears/year during RY00–RY01. This increase has stabilized, and harvest is still very low. The increase was likely due to the bag limit liberalization and tag fee exemption in the unit.

Annual review of sealing certificate data will continue. Sex ratios of harvested bears continue to favor males. Compliance with reporting requirements by local residents is low. This could be due to the requirement of a $25 resident brown bear tag except in Unit 19D and by resident hunters who obtain a harvest permit for grizzly bears in the Western Alaska Brown Bear Management Area. It is also likely that most grizzly bears taken out of season in this area are shot as nuisances, not necessarily for hide nor meat. To increase harvest reporting we will continue to emphasize the regulatory requirements for legal harvest and for bears taken in defense of life or property when we make personal contacts in villages and fish camps.

We did not meet our management objective to sustain a mean annual harvest of no more than 70 bears but met our objective of a minimum of 50% males. Through educational efforts we met our objective to increase the reporting of bears taken by local residents. To further improve reported harvest, other parts of Units 19, 21A and 21E may warrant more educational efforts, especially in the schools.

For the next reporting period our objective will be to manage brown bear populations to sustain a mean annual harvest of no more than 70 bears with a minimum of 50% males in the harvest. The following objectives are not quantifiable objectives and will be conducted as

activities: 1) to allow an increased legal harvest of brown bears in and around villages, fish camps, and other human habitations during open seasons to reduce human–bear conflicts during closed seasons; and 2) to increase reported harvest.

During the next reporting period we should further examine the applicability of density extrapolations and associated guideline harvest limits in these units. Bag limit and season changes should be reassessed in order to maintain our management goals of providing opportunities to hunt large bears, hunt under aesthetically pleasing conditions, and provide increased hunting opportunity.

LITERATURE CITED

MILLER S., G.C. WHITE, R.A. SELLERS, H.V. REYNOLDS, J.W. SCHOEN, K. TITUS, V.G. BARNES, JR., R.B. SMITH, R.R. NELSON, W.B. BALLARD, AND C.C. SCHWARTZ. 1997. Brown and black bear density estimation in Alaska using radiotelemetry and replicated mark-resight techniques. *Wildlife Monographs* 133.

PEGAU R. 1987. Unit 19 brown bear. Pages 42–43 *in* B Townsend, editor. Management report of survey–inventory activities. Part V. Volume XVIII. Alaska Department of Fish and Game. Grants W-22-5 and W-22-6. Study 4.0. Juneau, Alaska, USA.

REYNOLDS H.V. 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-24-1, W-24-2, W-24-3, and W-24-4. Study 4.25. Juneau, Alaska, USA.

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TABLE 1 Units 19, 21A, and 21E grizzly bear harvest by season, regulatory years 1990–2001

Regulatory year/	Unit 19 subunits					Unit 21 subunits		
Season	A	B	C	D	Unk	A	E	Total
1990–1991								
Fall 1990	2	7	10	6	0	1	1	27
Spring 1991	0	8	4	1	0	1	2	16
Total	2	15	14	7	0	2	3	43
1991–1992								
Fall 1991	2	14	8	1	0	0	0	25
Spring 1992	2	4	1	1	0	0	5	13
Total	4	18	9	2	0	0	5	38
1992–1993								
Fall 1992	10	22	14	3	0	2	1	52
Spring 1993	1	6	1	1	0	0	4	13
Total	11	28	15	4	0	2	5	65
1993–1994								
Fall 1993	3	21	13	1	0	0	0	38
Spring 1994	1	4	1	0	0	0	4	10
Total	4	25	14	1	0	0	4	48
1994–1995								
Fall 1994	6	22	14	1	0	1	0	44
Spring 1995	2	4	2	1	0	2	4	15
Total	8	26	16	2	0	3	4	59
1995–1996								
Fall 1995	7	27	14	1	0	0	0	49
Spring 1996	0	3	4	1	0	0	2	10
Total	7	30	18	2	0	0	2	59
1996–1997								
Fall 1996	8	6	13	2	0	2	1	32
Spring 1997	1	7	6	0	0	0	2	16
Total	9	13	19	2	0	2	3	48
1997–1998								
Fall 1997	9	23	22	0	0	2	2	58
Spring 1998	1	4	3	0	0	0	8	16
Total	10	27	25	0	0	2	10	74
1998–1999								
Fall 1998	6	27	21	5	1	1	0	61
Spring 1999	0	9	3	0	0	0	3	15
Total	6	36	24	5	1	1	3	76
1999–2000								
Fall 1999	11	33	21	5	0	0	2	72
Spring 2000	2	6	2	0	0	0	10	20
Total	13	39	23	5	0	0	12	92

Regulatory year/	Unit 19 subunits					Unit 21 subunits		
Season	A	B	C	D	Unk	A	E	Total
2000–2001								
Fall 2000	13	33	14	6	1	2	0	69
Spring 2001	0	10	6	1	0	1	8	26
Total	13	43	20	7	1	3	8	95
2001–2002								
Fall 2001	5	48	12	4	0	4	1	74
Spring 2002	3	10	1	1	0	0	5	20
Total	8	58	13	5	0	4	6	94
Fall totals	82	283	176	35	2	15	8	601
Fall % of harvest	86%	79%	84%	83%	100%	79%	12%	76%
Fall average	6.8	23.6	14.7	2.9	0.2	1.2	0.7	50.1
Spring totals	13	75	34	7	0	4	57	190
Spring % of harvest	14%	21%	16%	17%	0%	21%	88%	24%
Spring average	1.1	6.2	2.8	0.6	0.0	0.3	4.7	15.8
Grand total	95	358	210	42	2	19	65	791
Annual average	7.9	29.8	17.5	3.5	0.2	1.6	5.4	65.9

TABLE 2 Units 19, 21A and 21E grizzly bear harvest by type of kill, regulatory years 1993–2001

Regulatory year	Hunter kill				Nonhunting kill				Total reported kill				
	M	F	Unk	Total	M	F	Unk	Total	M	(%)	F	(%)	Total
1993–1994													
Fall 1993	20	18	0	38	0	0	0	0	20	(53)	18	(47)	38
Spring 1994	9	1	0	10	0	0	0	0	9	(90)	1	(10)	10
Total	29	19	0	48	0	0	0	0	29	(60)	19	(40)	48
1994–1995													
Fall 1994	24	19	1	44	0	0	0	0	24	(56)	19	(44)	44
Spring 1995	12	3	0	15	0	0	0	0	12	(80)	3	(20)	15
Total	36	22	1	59	0	0	0	0	36	(62)	22	(38)	59
1995–1996													
Fall 1995	29	18	1	48	0	0	1	1	29	(62)	18	(38)	49
Spring 1996	6	4	0	10	0	0	0	0	6	(60)	4	(40)	10
Total	35	22	1	58	0	0	1	1	35	(61)	22	(39)	59
1996–1997													
Fall 1996	18	14	0	32	0	0	0	0	18	(56)	14	(44)	32
Spring 1997	7	9	0	16	0	0	0	0	7	(44)	9	(56)	16
Total	25	23	0	48	0	0	0	0	25	(52)	23	(48)	48
1997–1998													
Fall 1997	36	22	0	58	0	0	0	0	36	(62)	22	(38)	58
Spring 1998	14	2	0	16	0	0	0	0	14	(88)	2	(12)	16
Total	50	24	0	74	0	0	0	0	50	(68)	24	(32)	74
1998–1999													
Fall 1998	39	22	0	61	0	0	0	0	39	(64)	22	(36)	61
Spring 1999	12	3	0	15	0	0	0	0	12	(80)	3	(20)	15
Total	51	25	0	76	0	0	0	0	51	(67)	25	(33)	76
1999–2000													
Fall 1999	38	31	0	69	2	1	0	3	40	(56)	32	(44)	72
Spring 2000	16	4	0	20	0	0	0	0	16	(80)	4	(20)	20
Total	54	35	0	89	2	1	0	3	56	(61)	36	(39)	92
2000–2001													
Fall 2000	44	25	0	69	0	0	0	0	44	(64)	25	(36)	69
Spring 2001	22	4	0	26	0	0	0	0	22	(85)	4	(15)	26
Total	66	29	0	95	0	0	0	0	66	(69)	29	(31)	95
2001–2002													
Fall 2001	41	29	1	71	2	1	0	3	43	(59)	30	(41)	74
Spring 2002	18	2	0	20	0	0	0	0	18	(90)	2	(10)	20
Total	59	31	1	91	2	1	0	3	61	(66)	32	(34)	94
1993–2002 Totals:													
Fall total	289	198	3	490	4	2	1	7	293		200		497
Spring total	116	32	0	148	0	0	0	0	116		32		148
Grand total	405	230	3	638	4	2	1	7	409		232		645

TABLE 3 Units 19, 21A, and 21E grizzly bear successful hunter residency and effort, regulatory years 1993–2001

Regulatory year	Resident (%)	Nonresident (%)	Unk	Mean effort for successful hunters (days)	Total successful hunters
1993–1994	8 (17)	40 (83)	0	4.5	48
1994–1995	17 (29)	41 (71)	1	5.4	59
1995–1996	9 (16)	48 (84)	2	6.0	59
1996–1997	5 (10)	43 (90)	0	6.0	48
1997–1998	10 (14)	64 (86)	0	4.4	74
1998–1999	15 (20)	61 (80)	0	5.0	76
1999–2000	20 (22)	71 (78)	1	4.9	92
2000–2001	13 (14)	82 (86)	0	4.9	95
2001–2002	18 (19)	76 (81)	0	5.2	94
Totals	115	526	4	46.3	645
Averages	12.8	58.4	0.4	5.1	71.7

TABLE 4 Units 19, 21A, and 21E grizzly bear harvest chronology by month, regulatory years 1993–2001

Regulatory year	Month of harvest (%)					
	Sep	Oct	Apr	May	Other[a]	*n*
1993–1994	35 (73)	3 (6)	6 (13)	4 (8)	0 (0)	48
1994–1995	40 (68)	4 (7)	7 (12)	7 (12)	1 (1)	59
1995–1996	48 (82)	0 (0)	6 (10)	4 (7)	1 (1)	59
1996–1997	30 (63)	2 (4)	3 (6)	13 (27)	0 (0)	48
1997–1998	56 (75)	2 (3)	11 (15)	5 (7)	0 (0)	74
1998–1999	51 (67)	10 (13)	7 (9)	8 (11)	0 (0)	76
1999–2000	67 (73)	4 (4)	15 (16)	5 (6)	1 (1)	92
2000–2001	60 (63)	7 (7)	16 (17)	10 (10)	2 (2)	95
2001–2002	66 (70)	5 (5)	13 (14)	6 (6)	4 (4)	94
Totals	453	37	84	62	9	645
Averages	50.3	4.1	9.3	6.9	1.0	71.7

[a] Other = Jan, Mar, Jul, Aug, Nov, and Dec. Table includes defense of life or property kills.

TABLE 5 Units 19, 21A, and 21E grizzly bear harvest by transport method, regulatory years 1993–2001

Regulatory year	Harvest by transport method (%)									*n*
	Airplane	Dog Team /Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
1993–1994	39 (82)	2 (4)	1 (2)	0 (0)	3 (6)	1 (2)	0 (0)	2 (4)	0 (0)	48
1994–1995	52 (88)	2 (3)	0 (0)	0 (0)	3 (5)	0 (0)	1 (2)	1 (2)	0 (0)	59
1995–1996	57 (96)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	59
1996–1997	45 (94)	0 (0)	2 (4)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	48
1997–1998	54 (73)	0 (0)	4 (6)	6 (8)	8 (11)	0 (0)	0 (0)	1 (1)	1 (1)	74
1998–1999	66 (88)	1 (1)	3 (4)	2 (3)	1 (1)	1 (1)	0 (0)	1 (1)	1 (1)	76
1999–2000	76 (83)	0 (0)	2 (2)	2 (2)	10 (11)	0 (0)	0 (0)	1 (1)	1 (1)	92
2000–2001	84 (88)	0 (0)	3 (3)	3 (3)	2 (2)	1 (1)	2 (2)	0 (0)	0 (0)	95
2001–2002	78 (83)	1 (1)	5 (5)	3 (3)	2 (2)	0 (0)	0 (0)	3 (3)	2 (2)	94
Totals	551	6	21	17	29	3	3	9	6	645
Averages	61.2	0.7	2.3	1.9	3.2	0.3	0.3	1	0.7	71.7

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
907-465-4190 PO BOX 25526
JUNEAU, AK 99802-5526

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 20A, 20B, 20C, 20F, and 25C (39,228 mi^2)

GEOGRAPHIC DESCRIPTION: Central and Lower Tanana Valley, and Middle Yukon River drainages

BACKGROUND

Grizzly bears are found throughout this area, with higher densities in the mountainous portions of Units 20A and 20C. We initiated a long-term grizzly bear research project in Unit 20A in 1981 to 1) gather baseline data on population status and reproductive biology (1981–1985; Reynolds and Hechtel 1986), 2) study the effects of high exploitation rates on grizzly bear population dynamics (1986–1991; Reynolds and Boudreau 1992, Reynolds 1993), and 3) measure recovery. During the second phase of the project, the grizzly bear population was deliberately subjected to high harvest levels (≥11% of the population versus ≤6% before 1981). As a result, Reynolds (1993) documented a 20% decline in the bears (≥2-years old) in this area since 1981. The final phase of the study examined population recovery (Reynolds 1999). Accordingly, the Alaska Board of Game reduced season length to increase recruitment and survival of female bears.

State regulations prevent grizzly bear harvest within the Denali National Park portions of Unit 20C, resulting in low harvests in that unit. The eastern half of Unit 20B supports a moderate density of grizzly bears, and harvests are higher than in western Unit 20B. Grizzly bears inhabit the remainder of the area at lower densities, resulting in low harvests.

Ballard et al. (1981) and Gasaway et al. (1992) identified grizzly bears as significant predators of moose in Units 13 and 20E, respectively. However, Gasaway et al. (1983) determined that grizzly bears played little role in the dynamics of moose within the Tanana Flats portion of Unit 20A, and Miller and Ballard (1992) did not detect changes in moose calf survival during periods when bear numbers were reduced in Unit 13. In Unit 20A, Valkenburg (1997) identified grizzly bears as important predators of Delta caribou herd neonates. Grizzly bears probably influence moose population dynamics in parts of this management area at different times.

During the 1980s, McNay (1990) noted increasing numbers of hunters and increased interest in hunting grizzly bears. He analyzed harvest and population data from this management area to develop specific management and harvest objectives which he based on a sustainable harvest rate of 8% of the population ≥2 years of age (Miller 1990).

In the early 1990s, Eagan (1995) estimated grizzly bear numbers in the management area at unit, subunit, and subarea (e.g., Unit 20A mountains, Unit 20A Tanana Flats) scales using a stratified approach based on topography, habitat and accessibility to humans. These estimates provided more precise measures of harvest rates across the management area, and subsequently, improved evaluation of harvest-based management objectives.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Units 20A, 20B, 20C, 20F, and 25C

- Maintain healthy grizzly populations and the ecosystems upon which they depend.
- Provide people with an opportunity to hunt, view, and photograph grizzly bears.
- Avoid human–grizzly bear interactions that threaten human life and property.

Additionally in Unit 20A

- Provide for scientific and educational use of grizzly bears.

Additionally in Unit 20C

- Maintain a grizzly bear population within Denali National Park that is largely unaffected by human activity and is not subjected to hunting within the park.

MANAGEMENT OBJECTIVES

Unit 20A Mountains

- Decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥2-years old.

Eastern half of Unit 20B

- Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 6 bears ≥2-years old.

Unit 20C within the original boundaries of Denali National Park

- Maintain a closed season on grizzly bear hunting.

Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C

- Manage human-caused mortality in the combined area to provide stable grizzly bear populations with a 3-year mean annual human-caused mortality of no more than 26 grizzly bears ≥2-years old.

- Manage the 3-year mean annual human-caused grizzly bear (≥2 years of age) mortality from individual areas with the following harvest objectives: no more than 3 bears from Unit 20A Tanana Flats, 3 from the western half of Unit 20B, 7 from Unit 20C, 7 from Unit 20F, and 6 from Unit 25C.

Units 20A, 20B, 20C, 20F, and 25C

Manage for a 3-year mean annual human-caused mortality of at least 55% males.

METHODS

HARVEST

We used data from grizzly bear sealing certificates to obtain date and location of kill, sex, skull size, hunter residency, transportation method, commercial services used and kill type – hunter harvest, illegal kill, research mortality, defense of life or property, etc. We coded location of kill according to Uniform Coding Units (UCU). During sealing we collected premolars to determine age. ADF&G Wildlife Conservation staff in Fairbanks sealed most of the grizzly bears harvested in this area.

We analyzed grizzly bear harvest data by both regulatory (RY) (RY = 1 Jul through 30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001) and calendar years. Many of our harvest objectives are age-specific. Analysis by regulatory year creates difficulties because a cohort passes through 2 age classes within a single regulatory year. Therefore, we analyzed data relevant to age-specific objectives by calendar year to avoid confusion regarding age-class. We based all other analyses on regulatory years.

POPULATION SIZE AND DENSITY

In June 1993, H. Reynolds and R. Eagan (Eagan 1995) categorized UCUs in Units 20A, 20B, 20C, 20F, and 25C into 4 grizzly bear density strata: low, medium, high, and super. The low-density stratum consisted of areas with significant human development, poorly drained soils (or permafrost) and black spruce. The medium-density stratum included upland forest and tundra habitats at elevations generally between 500 and 1500 ft. The high-density stratum consisted of upland foothills and mountainous areas similar to areas of known density in Units 20A, 20E, and 13E. The super-density stratum included habitat similar to the high-density areas, but where no harvest was permitted.

The total area within each stratum excluded glaciers and land above 6000 ft. Approximately 500 mi^2 (1300 km^2) was excluded from the high-density stratum, and 386 mi^2 (1000 km^2) was excluded from the super-density stratum. Population size was estimated using extrapolations from stratum densities of low, 3–8 bears/1000 mi^2 (1–3 bears/1000 km^2); medium, 13–26

bears/1000 mi^2 (5–10 bears/1000 km^2); high, 36–44 bears/1000 mi^2 (14–17 bears/1000 km^2); and super, 52–78 bears/1000 mi^2 (20–30 bears/1000 km^2).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Unit 20A. Eagan (1995) classified the mountainous portion of Unit 20A as high density based on results from research in the central foothills (Reynolds 1993). High harvest rates intentionally resulted in reduced bear numbers in this portion of Unit 20A during phase 2 of the research. Phase 3 monitored recovery of the population. We expected the number of female adult bears to meet prereduction levels by 1998. However, numbers were still estimated to be slightly low by spring 2000. Based on predicted trends and anecdotal information, we suspect the grizzly bear population recovered to prereduction levels by 2002.

The Tanana Flats in Unit 20A provide relatively poor grizzly bear habitat, resulting in low densities. Some grizzly bears on the Tanana Flats probably disperse from higher density areas, or make temporary forays onto the flats. Eagan (1995) estimated that the flats provide habitat for 20 grizzly bears, or 6.5 bears/1000 mi^2 (2.5 bears/1000 km^2).

Unit 20B. Eagan (1995) classified most of Unit 20B as low density because of the moderate habitat, high density of people, and good human access. Better habitat in the Sawtooth Mountains in the western portion was classified as low-density stratum because of good access and human activity. The upper Chena and Salcha Rivers rated medium density because it was better habitat and relatively inaccessible.

Unit 20C. Eagan (1995) classified the mountainous portion of Unit 20C into the super-density stratum (52–78 bears/1000 mi^2 [20–30 grizzly bears/1000 km^2]). Although Dean (1987) estimated 88 bears/1000 mi^2 (34 bears/1000 km^2) for a portion of this area in 1983, he surveyed the area along the Denali Park Road that includes the best habitat. Eagan (1995) assumed lower densities for the remainder of the mountainous portions of Unit 20C, based on densities Reynolds (1993) documented in Unit 20A in 1981.

Eagan (1995) classified a small portion of northwestern Unit 20C as medium density because of higher habitat quality than in the Unit 20C Tanana Flats, and the area also abuts some relatively good grizzly bear habitat in the upper Kuskokwim drainage. Eagan (1995) felt the remainder of Unit 20C was low density but indicated potential for slightly higher densities than other low density areas because the Unit 20C Tanana Flats have streams where salmon are available and there is relatively low hunting pressure.

Unit 20F. Although very little information exists, the Tozitna River drainage/Ray Mountains portion of Unit 20F probably contains relatively good grizzly bear habitat and warranted medium density classification. Eagan (1995) classified the remainder of Unit 20F as low density due to relatively poor grizzly bear habitat.

Unit 25C. Eagan (1995) classified the mountainous portion of Unit 25C as medium density. This is an extension of the medium density area of eastern Unit 20B and also includes the White Mountains. Although good habitat abounds, Eagan (1995) noted that roads and trails through the area provide good human access. Hunters take grizzly bears incidental to their pursuit of caribou and moose.

All Subunits. Extrapolating from the stratification above, Eagan (1995) estimated that 446–782 grizzly bears (all ages) inhabit the area. Using the midpoint of the population estimate (614 bears), the combined density for the area is about 16.1 bears/1000 mi^2 (6.2 grizzly bears/1000 km^2).

Population Composition

Reynolds (1993) summarized composition data for his study area in Unit 20A. In 1992, there were more females than males present in adult age classes, and approximately equal numbers of males and females in the subadult age classes. Because the sex ratio of grizzly bears at birth typically approximates 50:50; hunters generally prefer to shoot the larger, adult males; and because females with cubs <2 years of age are legally protected, we suspect the 1992 composition data is currently applicable.

Distribution and Movements

Reynolds (1997) described movement and dispersal trends for the Unit 20A study area. Females exhibited high fidelity to home ranges and little emigration or immigration (Reynolds 1993).

MORTALITY

Harvest

Season and Bag Limit. From RY90 through RY93, the season for grizzly bears was 1 September–31 May with a bag limit of 1 bear every 4 regulatory years. Cubs (<2 years of age) and sows accompanied by cubs were illegal to harvest. Commensurate with research objectives, the Board of Game shortened the Unit 20A season by 9 days in RY94 to 10 September–31 May. In RY02 the board liberalized the season by 5 days (5 Sep–31 May) based on evidence that the population had recovered to prereduction levels. All other areas covered in this report retained the 1 September opening. These seasons and bag limits applied to both resident and nonresident hunters.

Harvest by Hunters. Recent harvests in Units 20A, 20B, 20C, 20F, and 25C have been relatively stable (Tables 1a–e). Hunters killed 37 bears in all units during RY00 and 30 during RY01. Other human-caused mortality (defense of life or property kills, illegal kills, etc.) resulted in 4 bear deaths in RY00 and 4 deaths in RY01.

Harvest Zones.

Unit 20A Mountains — We estimate the 3-year (1999–2001) mean annual human–caused mortality (12.7 bears) was approximately 10–11% of bears ≥2-years old, assuming Eagan's (1995) population estimates and Reynolds' (1993) population structure (Table 2). This did not

meet our objective to decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥2-years old. Average annual proportion of males in the harvest for RY99–RY01 was 62% (n = 37), which met our objective of ≥55% males in the harvest.

Eastern half of Unit 20B — The 3-year (1999–2001) mean annual human–caused mortality of 5.7 bears ≥2 years of age met our objective of a mean of not more than 6 bears/year (Table 2). This was an improvement over the last reporting period when the 3-year mean of 7 bears exceeded the objective. Average annual proportion of males in the harvest during RY99–RY01 was 67% (n = 18), which met our harvest composition objective of at least 55%.

Unit 20A Tanana Flats, western half of Unit 20B, Unit 20C outside Denali National Park, and all of Units 20F and 25C — The 3-year (1999–2001) mean annual human–caused mortality of 15.0 bears ≥2 years of age was 58% below our objective of 26 bears ≥2 years of age (Table 2). Average annual harvest for RY99–RY01 was 56% (n = 54), which met our objective of at least 55% males in the harvest.

We also met our 3-year (1999–2001) mean annual human–caused mortality (bears ≥2 years of age) objectives for the Unit 20A Tanana Flats with a harvest of 1.7 bears, western Unit 20B with 2.7 bears, Unit 20C with 7 bears, Unit 20F with 1 bear, and Unit 25C with 1 bear. Meeting the management objective for the western half of Unit 20B is worth noting, since it was the one area in which harvest (5.7 bears) exceeded the objective of 3 bears during the last reporting period.

Hunter Residency and Success. As in previous years, Alaska residents harvested the majority (72%) of the grizzly bears during the last 3 regulatory years (Table 3).

Harvest Chronology. Hunters harvested bears primarily during the month of September (Table 4), probably because moose and caribou hunters take many bears incidentally during that period.

Transport Methods. The methods of transportation used by successful grizzly bear hunters have not changed substantially in recent years. One notable exception was RY98 which had uncharacteristic changes in the use of airplanes, highway vehicles, and other ORVs (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

We did not meet the management objective of a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥2-years old in Unit 20A mountains, even with the short season. However, the population estimates used to calculate the percent harvested was from 1992 census data and bear numbers had likely increased resulting in inflated harvest rates. Failing to meet the objective is not of great concern, since it was aimed at increasing bear numbers during the recovery phase, which did increase despite harvest exceeding recommended levels. Post recovery, the management objective is to achieve population stability, which allows for increased rates of harvest. However, with liberalized seasons, areas with high harvest density, such as the Ferry Trail Management Area and the Yanert River drainage, may be subject to localized overharvest.

We must continue to closely monitor harvests, particularly in harvest zones with small harvest quotas, and to encourage the harvest of males over females. We will continue to address this issue through education (e.g., Public Information Service and bear hunting seminars).

Finally, the objective for Unit 20A Mountains will change for the next reporting period from: "*Decrease human-caused grizzly bear mortality by managing for a 3-year mean annual human-caused mortality of no more than 6% of the bears ≥2-years old"* to: *"Manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality of up to 8% of the bears ≥2-years old."* Rationale includes: 1) We currently estimate that the Unit 20A grizzly bear population has recovered to prereduction levels. Therefore, the overall objective of managing for decreased human-caused grizzly bear mortality and subsequent population growth has changed to one of managing to provide for a stable population; and 2) The board liberalized grizzly bear seasons in 2002 to provide additional hunting opportunity and increased harvests.

LITERATURE CITED

BALLARD W.B., T.H. SPRAKER, AND K.P. TAYLOR. 1981. Causes of neonatal moose calf mortality in Southcentral Alaska. *Journal of Wildlife Management* 45:335–342.

DEAN F.C. 1987. Brown bear density Denali National Park, Alaska, and sighting efficiency adjustment. International conference bear research and management. 7:37–43.

EAGAN R.M. 1995. Units 20A, 20B, 20C, 20F, and 25C. Pages 192–212 *in* MV Hicks, editor. Brown bear management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-24-1 and W-24-2. Study 4.0. Juneau, Alaska, USA.

GASAWAY W.C., R.D. BOERTJE, D.V. GRANGAARD, D.G. KELLEYHOUSE, R.O. STEPHENSON, AND D.G. LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120.

———, R.O. STEPHENSON, J.L. DAVIS, P.E. SHEPHERD, AND OE BURRIS. 1983. Interrelationships of wolves, prey, and man in Interior Alaska. Wildlife Monographs 84. *Journal of Wildlife Management*.

MCNAY M.E. 1990. Units 20A, 20B, 20C, 20F, and 25C brown bear. Pages 121–136 *in* SO Morgan, editor. Brown bear management report of survey–inventory activities. Part V. Volume XX. Alaska Department of Fish and Game. Grant W-23-2. Study 4.0. Juneau, Alaska, USA.

MILLER S.D. 1990. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-3. Study 4.21. Juneau, Alaska, USA.

——— AND W.B. BALLARD. 1992. Analysis of an effort to increase moose calf survivorship by increased hunting of brown bears in south-central Alaska. *Wildlife Society Bulletin* 20:445–454.

REYNOLDS H.V. 1993. Evaluation of the effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grant W-23-5. Study 4.23. Juneau, Alaska, USA.

——— 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-24-1, W-24-2, W-24-3 and W-24-4. Study 4.25. Juneau, Alaska, USA.

——— 1999. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-24-5 and W-27-1. Study 4.28. Juneau, Alaska, USA.

——— AND T.A. BOUDREAU. 1992. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska, USA.

——— AND J.L. HECHTEL. 1986. Population structure, reproductive biology, and movement patterns of grizzly bears in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-21-2, W-22-2, W-22-3, and W-22-4. Study 4.16R. Juneau, Alaska, USA.

VALKENBURG P. 1997. Investigation of regulating and limiting factors in the Delta Caribou Herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-23-5, W-24-1, W-24-2, W-24-3, and W-24-4. Study 3.37. Juneau, Alaska, USA.

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TABLE 1A Unit 20A grizzly bear harvest, regulatory years 1997–1998 through 2001–2002

Regulatory year	Reported											
	Hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1997–1998												
Fall 1997	6	4	0	10	0	2	0	6	6	0	12	
Spring 1998	4	0	0	4	1	0	0	5	0	0	5	
Total	10	4	0	14	1	2	0	11	6	0	17	65
1998–1999												
Fall 1998	3	2	0	5	0	0	0	3	2	0	5	
Spring 1999	4	0	0	4	0	0	0	4	0	0	4	
Total	7	2	0	9	0	0	0	7	2	0	9	78
1999–2000												
Fall 1999	10	4	0	14	0	1	0	10	5	0	15	
Spring 2000	1	0	0	1	2	0	0	3	0	0	3	
Total	11	4	0	15	2	1	0	13	5	0	18	72
2000–2001												
Fall 2000	7	4	0	11	0	0	0	7	4	0	11	
Spring 2001	0	0	0	0	0	0	0	0	0	0	0	
Total	7	4	0	11	0	0	0	7	4	0	11	64
2001–2002												
Fall 2001	5	6	1	12	1	1	0	6	7	1	14	
Spring 2002	0	0	0	0	0	0	0	0	0	0	0	
Total	5	6	1	12	1	1	0	6	7	1	14	46

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

TABLE 1B Unit 20B grizzly bear harvest, regulatory years 1997–1998 through 2001–2002

Regulatory year	Reported											
	Hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1997–1998												
Fall 1997	2	1	0	3	0	0	0	2	1	0	3	
Spring 1998	0	2	0	2	0	3	0	0	5	0	5	
Total	2	3	0	5	0	3	0	2	6	0	8	25
1998–1999												
Fall 1998	8	0	0	8	1	1	0	9	1	0	10	
Spring 1999	1	0	0	1	0	0	0	1	0	0	1	
Total	9	0	0	9	1	1	0	10	1	0	11	91
1999–2000												
Fall 1999	2	3	0	5	0	0	0	2	3	0	5	
Spring 2000	1	1	0	2	0	0	0	1	1	0	2	
Total	3	4	0	7	0	0	0	3	4	0	7	43
2000–2001												
Fall 2000	11	3	0	14	0	0	0	11	3	0	14	
Spring 2001	0	0	0	0	1	1	0	1	1	0	2	
Total	11	3	0	14	1	1	0	12	4	0	16	75
2001–2002												
Fall 2001	1	2	0	3	0	0	0	1	2	0	3	
Spring 2002	3	0	0	3	2	0	0	5	0	0	5	
Total	4	2	0	6	2	0	0	6	2	0	8	75

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

TABLE 1C Unit 20C grizzly bear harvest, regulatory years 1997–1998 through 2001–2002

Regulatory year	Reported											
	Hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1997–1998												
Fall 1997	4	0	0	4	0	0	0	4	0	0	4	
Spring 1998	1	0	0	1	0	0	0	1	0	0	1	
Total	5	0	0	5	0	0	0	5	0	0	5	100
1998–1999												
Fall 1998	2	1	0	3	0	0	0	2	1	0	3	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	2	1	0	3	0	0	0	2	1	0	3	67
1999–2000												
Fall 1999	2	4	0	6	1	1	0	3	5	0	8	
Spring 2000	0	0	0	0	0	0	0	0	0	0	0	
Total	2	4	0	6	1	1	0	3	5	0	8	38
2000–2001												
Fall 2000	4	4	0	8	2	0	0	6	4	0	10	
Spring 2001	0	0	0	0	0	0	0	0	0	0	0	
Total	4	4	0	8	2	0	0	6	4	0	10	60
2001–2002												
Fall 2001	0	4	0	4	0	0	0	0	4	0	4	
Spring 2002	3	0	0	3	0	0	0	3	0	0	3	
Total	3	4	0	7	0	0	0	3	4	0	7	43

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

TABLE 1D Unit 20F grizzly bear harvest, regulatory years 1997–1998 through 2001–2002

Regulatory year	Reported											
	Hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1997–1998												
Fall 1997	1	0	0	1	0	0	0	1	0	0	1	
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
1998–1999												
Fall 1998	1	0	0	1	0	0	0	1	0	0	1	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
1999–2000												
Fall 1999	0	1	0	1	0	0	0	0	1	0	1	
Spring 2000	0	0	0	0	0	0	0	0	0	0	0	
Total	0	1	0	1	0	0	0	0	1	0	1	0
2000–2001												
Fall 2000	0	0	0	0	0	0	0	0	0	0	0	
Spring 2001	1	1	0	2	0	0	0	1	1	0	2	
Total	1	1	0	2	0	0	0	1	1	0	2	50
2001–2002												
Fall 2001	0	0	0	0	0	0	0	0	0	0	0	
Spring 2002	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

TABLE 1E Unit 25C grizzly bear harvest, regulatory years 1997–1998 through 2001–2002

Regulatory year	Reported											
	Hunter kill[a]				Nonhunting kill[b]			Total estimated kill[c]				
	M	F	Unk	Total	M	F	Unk	M	F	Unk	Total	% Males
1997–1998												
Fall 1997	1	0	0	1	0	0	0	1	0	0	1	
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	
Total	1	0	0	1	0	0	0	1	0	0	1	100
1998–1999												
Fall 1998	0	1	0	1	0	0	0	0	1	0	1	
Spring 1999	0	0	0	0	0	0	0	0	0	0	0	
Total	0	1	0	1	0	0	0	0	1	0	1	0
1999–2000												
Fall 1999	0	0	0	0	0	0	0	0	0	0	0	
Spring 2000	1	0	0	1	0	0	0	1	0	0	1	
Total	1	0	0	1	0	0	0	1	0	0	1	100
2000–2001												
Fall 2000	2	1	0	3	0	0	0	2	1	0	3	
Spring 2001	0	0	0	0	0	0	0	0	0	0	0	
Total	2	1	0	3	0	0	0	2	1	0	3	67
2001–2002												
Fall 2001	3	2	0	5	0	0	0	3	2	0	5	
Spring 2002	0	0	0	0	0	0	0	0	0	0	0	
Total	3	2	0	5	0	0	0	3	2	0	5	60

[a] Includes illegal kills.

[b] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality. These data not included in tables of chronology, transport, etc.

[c] Percentage includes only bears of known sex.

TABLE 2 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest in 3 zones, calendar years 1997 through 2001

Harvest zone	Area (mi^2)	Calendar year	Bears killed		3-year mean harvest		Harvest density[c]
			All ages[a]	≥2 years[b]	All ages	≥2 years[b]	
Unit 20A mountains	3,081[d]	1997	13 (2)	13	11.0	10.3	4.2
		1998	9 (1)	8	10.3	9.3	2.6
		1999	17 (1)	17	13.0	12.7	5.5
		2000	12 (2)	11	12.7	12.0	3.6
		2001	12 (2)	11	13.3	12.7	3.6
Eastern half of Unit 20B	4,929	1997	3 (0)	1	6.7	5.3	0.2
		1998	8 (2)	8	7.0	6.3	1.6
		1999	4 (0)	4	5.0	4.3	0.8
		2000	10 (0)	9	7.3	7.0	1.8
		2001	4 (1)	4	6.0	5.7	0.8
Unit 20A Flats, western half of		1997	12 (0)	12	12.0	12.0	0.5
Unit 20B, Unit 20C outside Denali		1998	14 (3)	14	14.7	14.7	0.5
National Park, Units 20F and 25C	26,278[e]	1999	13 (2)	12	13.0	12.7	0.5
		2000	22 (3)	18	16.3	14.7	0.7
		2001	14 (1)	14	16.7	15.0	0.5

[a] Numbers in parentheses indicate how many of these bears were killed by other than hunter harvest (i.e., defense of life or property, illegal kills, research activities).

[b] Assuming all bears of unknown age were ≥2-years old.

[c] Bears ≥2-years old harvested per 1000 m^2.

[d] Excludes about 500 m^2 (1300 km^2) of nonbear habitat in glaciers and above 6000 ft (1850 m).

[e] Excludes 4450 m^2 (11,500 km^2) that is closed to hunting in Denali National Park.

TABLE 3 Unit 20A, 20B, 20C, 20F, and 25C grizzly bear successful hunter residency[a], regulatory years 1997–1998 through 2001–2002

Regulatory year	Resident (%)	Nonresident (%)	Unknown (%)	*n*
1997–1998	18 (69)	8 (31)	0 (0)	26
1998–1999	20 (87)	3 (13)	0 (0)	23
1999–2000	20 (67)	9 (30)	1 (3)	30
2000–2001	29 (78)	8 (22)	0 (0)	37
2001–2002	21 (70)	9 (30)	0 (0)	30

[a] Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality bears.

TABLE 4 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest chronology percent by month/day, regulatory years 1997–1998 through 2001–2002

Regulatory	Harvest chronology percent by month/day[a]								
	Sep					May			
year	1–15	16–30	Oct–Nov	Total	Apr	1–15	16–31	Total	*n*
1997–1998	31	42	0	73	0	8	19	27	26
1998–1999	61	17	0	78	0	4	17	22	23
1999–2000	40	43	3	87	0	3	10	13	30
2000–2001	51	35	8	95	0	3	3	5	37
2001–2002	43	27	10	80	7	0	13	20	30

[a] Excludes defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

TABLE 5 Units 20A, 20B, 20C, 20F, and 25C grizzly bear harvest percent by transport method, regulatory years 1997–1998 through 2001–2002

Regulatory year	Harvest percent by transport method[a]								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	Other ORV	Highway vehicle	Other/Unk	*n*
1997–1998	23	15	8	31	0	4	8	12	26
1998–1999	4	17	13	22	0	17	13	13	23
1999–2000	30	10	10	27	0	10	3	10	30
2000–2001	24	5	11	27	0	0	24	8	37
2001–2002	33	10	3	33	0	3	10	7	30

[a] Does not include defense of life or property, research mortality, or other human-caused accidental or illegal mortality.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 20D (5637 mi^2)

GEOGRAPHIC DESCRIPTION: Central Tanana Valley near Delta

BACKGROUND

Brown bears are distributed throughout Unit 20D, however, the Tanana River separates brown bear habitat into 2 distinct types within the unit. Unit 20D south of the Tanana River is adjacent and similar to habitat described by Reynolds (1990) for the foothills and mountains of the northcentral Alaska Range. Brown bear habitat in Unit 20D north of the Tanana River is adjacent and similar to habitat described in Unit 20E by Gasaway et al. (1990) for the hills north of the Tanana River. Hunter access to southern Unit 20D is excellent, while hunter access is more difficult in northern Unit 20D.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- As directed by the Alaska Board of Game, manage grizzly bears to reduce the effects of predation on ungulate species in portions of Unit 20D.

MANAGEMENT OBJECTIVES

- Manage for an annual mortality of 5–15 bears/year.

- Manage for a 3-year mean annual human-caused mortality composed of at least 55% males.

METHODS

Successful hunters were required to have brown bears sealed at ADF&G offices. Data collected from each brown bear included sex, skull length and width, transportation used by the hunter, number of days hunted, date and location of kill, and hunter name and address. A premolar tooth was extracted from each bear skull for use in age determination. Bears that died from nonhunting mortality sources, such as those killed in defense of life or property,

were also sealed. Data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

I calculated brown bear population estimates for Unit 20D in May 1993. The Unit 20D estimate was 181–210 total bears, with 143–176 bears ≥2-years old. For the population estimate, I calculated separate estimates for Unit 20D north and south of the Tanana River as described below. I continued to use the 1993 estimates during this reporting period (RY00–RY01).

Southern Unit 20D. The population estimate for southern Unit 20D was 51–58 brown bears ≥2-years old and a total of 76–86 bears. This estimate was based on density estimates of 25.4–29.0 bears ≥2-years old/1000 mi^2, plus an additional 14% for cubs and yearlings, developed by Reynolds (1993) for similar habitat in the Alaska Range in Unit 20A.

Anecdotal information for southern Unit 20D from local residents, hunters, and pilots indicate that bears are common in most of the area. Residents commonly report bears near the town of Delta, near the landfill, and in the Delta Agricultural Project. Dall sheep, moose, and caribou hunters commonly report seeing bears in the foothills of the Alaska Range.

Northern Unit 20D. The population estimate for northern Unit 20D was 92–109 brown bears ≥2-years old and 105–124 total bears. This estimate was based on the Gasaway et al. (1990) brown bear density estimates for Unit 20E of 26.9–32.1 bears ≥2 years old/1000 mi^2, plus an additional 14% for cubs and yearlings.

Reynolds (ADF&G, personal communication) plans to refine Alaska Range brown bear density estimates upon which we based the population estimate for southern Unit 20D. He also plans to complete a population model that calculates sustainable harvest levels based on harvest of females, rather than the current model that uses total adult harvest as the basis for estimating harvest goals. When this information is available, the Unit 20D population estimate and management objectives should be reviewed and reevaluated.

Population Composition

Brown bear population composition is unknown for Unit 20D. Because cubs or females accompanied by cubs are illegal to harvest, the sex ratio of the harvest was not used to estimate population composition.

Distribution and Movements

Brown bears are distributed throughout Unit 20D; however, no specific information on patterns of brown bear distribution or movements is available.

MORTALITY

Season and Bag Limit. During RY00–RY01 those portions of Unit 20D south of the Tanana River and east of the east bank of the Gerstle River, or north of the Tanana River, had a 10 August–30 June hunting season for residents and nonresidents. The bag limit was 1 bear/year, and no tag fee was required of residents. Hunters taking bears in this area were required to have the bears sealed in Delta Junction or Tok.

The hunting season south of the Tanana River and west of the Gerstle River for residents and nonresidents was 1 September–31 May. The bag limit was 1 bear/4 regulatory years and a $25 tag was required of resident hunters.

Alaska Board of Game Actions and Emergency Orders.

RY00–RY01 — The Board of Game considered and approved annual reauthorizations of the brown bear tag fee exemption for those portions of Unit 20D south of the Tanana River and east of the east bank of the Gerstle River.

Hunter Harvest and Other Mortality.

RY00 — Hunters killed 16 bears (Table 1) and exceeded the harvest objective by 1 bear. Two of these bears were killed illegally. Hunter take consisted of 69% males. Hunters killed 9 bears in Unit 20D south of the Tanana River, west of the Gerstle River, where hunting regulations were most restrictive (Table 2). Where hunting regulations were least restrictive, hunters killed 7 bears south of the Tanana River, east of the Gerstle River, and 4 north of the Tanana River.

Four bears were also killed in defense of life or property (Table 1). Three were killed in southern Unit 20D, west of the Gerstle River and 1 was killed south of the Tanana River, east of the Gerstle River. Two of these bears were male and 2 were female.

The total reported mortality of 20 bears consisted of 65% males (Table 1). This was an estimated 10–11% of the unitwide brown bear population and 11–14% of bears ≥2-years old (although 1 illegal kill was a cub).

An estimated 1 bear is killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 21 bears (Table 1).

RY01 —Hunters killed 11 bears (Table 1) and met the harvest objective. One of the kills was illegal. Harvest was composed of 64% male bears. Hunters killed 9 bears in southern Unit 20D with 4 bears taken west of the Gerstle River in the area with most restrictive hunting regulations, and 5 taken east of the Gerstle River in the area with least restrictive hunting regulations (Table 2). Two bears were killed north of the Tanana River, also in the area with least restrictive hunting regulations.

One male bear was killed in defense of life or property west of the Gerstle River (Table 1).

The total reported mortality of 12 bears consisted of 64% males for bears of known sex (Table 1). Total reported mortality was an estimated 6–7% of the unitwide brown bear population and 7–8% of the estimated bears ≥2-years old.

An estimated 1 bear is killed each year and not reported. Adding this estimated mortality to reported mortality results in estimated total mortality of 13 bears (Table 1).

Hunter Residency and Success. No significant changes occurred in previous patterns of residency of hunters who were successful in Unit 20D during this reporting period. Most brown bears continued to be killed by residents. Of the bears taken in RY00 and RY01 by hunters for whom residency was known, Unit 20D residents took 42% of the harvest, nonlocal residents took 46%, and nonresidents took 12% (Table 3).

Harvest Chronology. No substantive changes occurred in previous patterns of harvest chronology during this reporting period. In Unit 20D most brown bears continued to be harvested during the fall hunting season, with most kills occurring in September (Table 4).

Transport Methods. During RY00 and RY01 most successful bear hunters used foot access. Three- or 4-wheelers and airplanes were the other commonly used transportation types for hunting brown bears in Unit 20D (Table 5).

CONCLUSIONS AND RECOMMENDATIONS

The harvest objective of 5–15 bears/year was exceeded by 1 bear in RY00 and was met in RY01. Hunters took predominantly male bears both years, allowing us to meet the objective to manage for a 3-year mean annual human-caused mortality of at least 55% males. The Board of Game reauthorized brown bear tag fee exemptions in portions of Unit 20D as part of an intensive management program to increase numbers of moose and caribou.

Total bear mortality in Unit 20D has increased since the $25 resident tag fee was eliminated in portions of Unit 20D. However, nuisance bears killed in defense of life or property and nonhunting mortality continues to be a significant source of mortality.

Based on my population estimates, brown bear mortality may be exceeding sustainable levels in southern Unit 20D. A substantial portion of the brown bear mortality west of the Gerstle River is due to nonhunting mortality that results from people living near brown bears. However, anecdotal observations indicate that bears remain plentiful in the area. This area will likely continue to experience high levels of bear mortality because of the number of human inhabitants and liberal hunting regulations. However, because this area is relatively small and surrounded by areas that have healthy brown bear populations, and because the Alaska Board of Game objective is to reduce predation on ungulates, no reduction in the hunting season dates and bag limits are planned at this time. There is significant demand for human use of moose and caribou in southern Unit 20D, and current population objectives are to increase the size of these ungulate populations. While there is little evidence that increased bear harvest results in increased moose numbers, a localized reduction in the brown bear population may benefit survival of moose and caribou calves.

The Unit 20D brown bear population should be monitored closely to determine long-term effects of liberal hunting regulations in portions of the unit and to monitor the population west of the Gerstle River where mortality rates are highest.

LITERATURE CITED

GASAWAY W.C., R.D. BOERTJE, D.V. GRANGAARD, D.G. KELLEYHOUSE, R.O. STEPHENSON, AND D.G. LARSEN. 1990. Factors limiting moose population growth in Subunit 20E. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-3 and W-23-3. Study 1.37. Juneau, Alaska, USA.

REYNOLDS H.V. 1990. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-2. Study 4.19. Juneau, Alaska, USA.

———. 1993. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-24-1. Study 4.25. Juneau, Alaska, USA.

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TABLE 1 Unit 20D brown bear mortality[a], regulatory years 1989–2001

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	F	Unk	Total
1989–1990													
Fall 1989	2	0	0	2	0	0	0	1	0	2	0	1	3
Spring 1990	2	0	0	2	0	0	0	0	0	2	0	0	2
Total	4	0	0	4	0	0	0	1	0	4	0	1	5
1990–1991													
Fall 1990	3	2	0	5	0	0	0	1	0	3	2	1	6
Spring 1991	0	2	0	2	0	0	0	0	0	0	2	0	2
Total	3	4	0	7	0	0	0	1	0	3	4	1	8
1991–1992													
Fall 1991	0	0	0	0	0	1	0	1	0	0	1	1	2
Spring 1992	2	3	0	5	0	0	0	0	0	2	3	0	5
Total	2	3	0	5	0	1	0	1	0	2	4	1	7
1992–1993													
Fall 1992	4	2	0	6	1	0	0	1	0	5	2	1	8
Spring 1993	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	6	3	0	9	1	0	0	1	0	7	3	1	11
1993–1994													
Fall 1993	5	1	0	6	0	0	0	1	0	5	1	1	7
Spring 1994	0	1	0	1	0	0	0	0	0	0	1	0	1
Total	5	2	0	7	0	0	0	1	0	5	2	1	8
1994–1995													
Fall 1994	2	2	0	4	0	0	0	1	0	2	2	1	5
Spring 1995	1	1	0	2	1	0	0	0	0	2	1	0	3
Total	3	3	0	6	1	0	0	0	0	4	3	1	8
1995–1996													
Fall 1995	8	3	0	11	0	0	0	1	0	8	3	1	12
Spring 1996	3	2	0	5	0	0	0	0	0	3	2	0	5
Total	11	5	0	16	0	0	0	1	0	11	5	1	17

Regulatory year	Reported							Estimated kill		Total reported and estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M	F	Unk	Total
1996–1997													
Fall 1996	4	2	0	6	0	3	0	1	0	4	5	1	10
Spring 1997	1	0	0	1	0	1	0	0	0	1	1	0	2
Total	5	2	0	7	0	4	0	1	0	5	6	1	12
1997–1998													
Fall 1997	3	3	0	6	0	0	0	1	0	3	3	1	7
Spring 1998	2	0	0	2	0	1	0	0	0	2	1	0	3
Total	5	3	0	8	0	1	0	1	0	5	4	1	10
1998–1999													
Fall 1998	8	1	0	9	2	2	0	1	0	10	3	1	14
Spring 1999	2	1	0	3	0	0	0	0	0	2	1	0	3
Total	10	2	0	12	2	2	0	1	0	12	4	1	17
1999–2000													
Fall 1999	4	2	0	6	0	0	0	1	0	4	2	1	7
Spring 2000	3	2	0	5	0	0	0	0	0	3	2	0	5
Total	7	4	0	11	0	0	0	1	0	7	4	1	12
2000–2001													
Fall 2000	7	5	0	12	1	2	0	1	0	8	7	1	16
Spring 2001	4	0	0	4	1	0	0	0	0	5	0	0	5
Total	11	5	0	16	2	2	0	1	0	13	7	1	21
2001–2002													
Fall 2001	6	3	1	10	1	0	0	1	0	7	3	2	12
Spring 2002	1	0	0	1	0	0	0	0	0	1	0	0	1
Total	7	3	1	11	1	0	0	1	0	8	3	2	13

[a] Includes defense of life or property kills, research moralities, and other known human-caused accidental mortality.

TABLE 2 Unit 20D brown bear mortality[a] with differing hunting regulations, regulatory years 1987–2001

Regulatory year	Southern Unit 20D: West of Gerstle River M	F	Unk	East of Gerstle River M	F	Unk location M	F	Total M	F	Northern Unit 20D M	F	Total Unit 20D M	F	Total bears M+F
	1 bear/4 yr, 1 Sep–31 May, $25 tag[b]													
1987–1988	2	0	0	4	4	1	0	7	4	0	1	7	5	12
1988–1989	1	1	0	1	1	0	0	2	2	2	0	4	2	6
1989–1990	2	0	0	0	0	0	0	2	0	2	0	4	0	4
1990–1991	1	2	0	2	0	0	1	3	3	0	1	3	4	7
1991–1992	2	3	0	0	1	0	0	2	4	0	0	2	4	6
Total kill	8	6	0	7	6	1	1	16	13	4	2	20	15	35
Kill/Year		Avg 3			Avg 3		Avg 0		Avg 6		Avg 1		Avg 7	
% Male	57			54		50		55		67		57		
	1 bear/4 yr, 1 Sep–31 May, $25 tag[b]									1 bear/yr, 10 Aug–30 Jun, no tag fee[b]				
1992–1993	4	1	0	1	1	0	1	5	3	2	0	7	3	10
1993–1994	2	0	0	2	1	0	0	4	1	1	1	5	2	7
1994–1995	3	2	0	1	1	0	0	4	3	0	0	4	3	7
Total kill	9	3	0	4	3	0	1	13	7	3	1	16	8	24
Kill/Year		Avg 4			Avg 2		Avg 0		Avg 7		Avg 1		Avg 8	
% Male	75			57		0		65		67		67		
	1 bear/4 yr, 1 Sep–31 May, $25 tag[b]			1 bear/yr, 10 Aug–30 Jun, no tag fee[b]						1 bear/yr, 10 Aug–30 Jun, no tag fee[b]				
1995–1996	4	1	0	3	1	0	0	7	2	4	3	11	5	16
1996–1997	3	4	0	1	1	0	0	4	5	1	1	5	6	11
1997–1998	3	3	0	0	0	0	0	3	4	2	1	5	4	9
1998–1999	10	3	0	2	0	0	0	12	3	0	1	12	4	16
1999–2000	1	2	0	2	1	0	0	3	3	4	1	7	4	11
2000–2001	6	3	0	3	4	0	0	9	7	4	0	13	7	20
2001–2002	3	1	1	3	2	0	0	7	3	2	0	9	3	12
Total kill	30	17	1	14	10	0	0	45	27	17	7	62	34	96
Kill/Year		Avg 7			Avg 3		Avg 0		Avg 10		Avg 3		Avg 14	
% Male	64			58		0		63		71		65		

[a] Includes nonhunting mortality.
[b] Hunting regulation.

TABLE 3 Residency of successful Unit 20D brown bear hunters (includes legal and illegal harvest; excludes defense of life and property kill), regulatory years 1989–2001

Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Unk	Total successful hunters
1989–1990	3	1	0	0	4
1990–1991	4	2	0	1	7
1991–1992	5	0	0	0	5
1992–1993	5	4	0	0	9
1993–1994	3	4	0	0	7
1994–1995	2	4	0	0	6
1995–1996	7	6	1	2	16
1996–1997	5	3	0	0	8
1997–1998	5	2	1	0	8
1998–1999	8	5	0	0	13
1999–2000	9	2	0	0	11
2000–2001	6	9	1	1	17
2001–2002	5	3	2	1	11

[a] Residents of Unit 20D.

TABLE 4 Chronology of Unit 20D brown bear harvest and nonhunting mortality by month, regulatory years 1989–2001

Regulatory year	Harvest by month								
	Aug	Sep	Oct	Nov	Apr	May	Jun	Other	*n*
1989–1990	0	2	0	0	0	2	0	0	4
1990–1991	0	5	0	0	0	2	0	0	7
1991–1992	0	1	0	0	0	4	1	0	6
1992–1993	0	4	2	0	0	3	0	1	10
1993–1994	1	4	0	1	0	1	0	0	7
1994–1995	0	4	0	0	0	2	1	0	7
1995–1996	1	9	1	0	0	2	3	0	16
1996–1997	2	5	1	0	0	1	1	1	11
1997–1998	0	5	1	0	0	2	1	0	9
1998–1999	4	7	0	2	0	3	0	0	16
1999–2000	1	3	2	0	0	2	3	0	11
2000–2001	3	9	2	0	0	2	3	1	20
2001–2002	5	4	1	0	0	0	0	2	12

TABLE 5 Unit 20D percent of brown bear harvest (includes legal and illegal harvest; excludes defense of life or property) by transport method, regulatory years 1989–2001

Regulatory year	Percent harvest by transport method										
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Foot	Other	Unk	*n*
1989–1990	0	0	25	0	0	25	25	25	0	0	4
1990–1991	0	14	0	0	0	57	14	14	0	0	7
1991–1992	0	0	0	0	20	20	0	0	60	0	5
1992–1993	11	11	11	22	0	0	33	11	0	0	9
1993–1994	14	0	29	0	0	0	43	14	0	0	7
1994–1995	17	17	0	33	0	0	17	17	0	0	6
1995–1996	25	0	13	25	0	0	31	6	0	0	16
1996–1997	0	0	25	13	0	13	38	0	13	0	8
1997–1998	13	0	13	25	0	13	13	0	25	0	8
1998–1999	0	0	0	54	0	0	8	39	0	0	13
1999–2000	9	0	9	0	0	9	27	46	0	0	11
2000–2001	12	0	12	29	0	6	12	29	0	0	17
2001–2002	27	0	0	27	0	0	9	36	0	0	11

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 20E (11,000 mi^2)

GEOGRAPHIC DESCRIPTION: Fortymile, Charley, and Ladue River drainages, including the Tanana Uplands and all drainages into the south bank of the Yukon River upstream from and including the Charley River drainage

BACKGROUND

The grizzly bear population in Unit 20E declined to low levels during the 1950s as a result of an intensive, year-round federal predator control program. After the program ended, bears were lightly exploited throughout the 1960s and 1970s. It is reasonable to assume that the population recovered to about 54 bears/1000 mi^2 (21 bears/1000 km^2) based on estimated grizzly bear densities in areas with comparable habitats (Reynolds 1997), although no studies specifically addressed this question in Unit 20E. There are no salmon spawning streams in Unit 20E and the natural density of bears is lower than areas with salmon.

During the early 1980s, moose densities in Unit 20E were low (0.2 moose/mi^2, 0.5 moose/km^2) and predation by grizzly bears was a major factor in limiting this population (Gasaway et al. 1992). In an attempt to reduce the grizzly bear population, hunting regulations were liberalized. Our objective was to reduce the grizzly population through increased harvest to a level that resulted in a substantial decline in bear predation on calf moose. Regulation changes included: lengthening the season; increasing the bag limit from 1 bear/4 years to 1 bear/year; and between 1984 and 1992, revoking the $25 resident grizzly bear tag fee. Annual grizzly bear harvests increased from a mean of 3 during regulatory years (RY) 1966 through RY81 (RY begins 1 Jul and ends 30 Jun; e.g., RY02 = 1 Jul 2002 through 30 Jun 2003) to a mean of 19 during RY82 through RY88. During the mid-1980s, Boertje et al. (1987) estimated the grizzly bear population in a portion of Unit 20E at 31–41 bears/1000 mi^2 (12–16 bears/1000 km^2) indicating a population decline. Changes in harvest rate, sex ratio, and average age of the harvested bears indicated that population reduction followed increased harvest.

Survival of moose calves to 5 months of age in Unit 20E increased between 1982 and 1990, during the period of liberalized bear seasons. We believed this was related to a reduction in predator:prey ratios because moose numbers slowly increased in areas where bear numbers

were decreasing. This interpretation has led to liberalized grizzly bear harvest regulations in other areas even though in many cases there have been no field studies designed to evaluate how increased bear harvest effects bear population trends and moose and caribou calf survival.

Further analysis of these data indicated that reductions in grizzly bear numbers did not improve moose calf survival in Unit 20E (Gardner 1993, 1995). Grizzly bear regulations were not further liberalized in Unit 20E during RY90–RY01, even though moose calf survival continued to be low and area Fish and Game advisory committees supported a resident tag fee exemption. ADF&G's opposition to the tag fee exemption during this period was because it had already been tried in Unit 20E and was unsuccessful.

One of the premises of liberalized bear regulations is that more bear hunters would be attracted to the area, resulting in a greater bear harvest. Reynolds (ADF&G, unpublished data) found that grizzly bear harvest increased in Unit 20A if bear seasons coincided with times that most moose and caribou hunters were afield. The impacts of the different bear regulatory changes on harvest were reviewed in Gardner (1999). In brief, eliminating the resident tag fee, increasing the season to include June, and increasing the bag limit to 1 bear/year did little to increase harvest in Unit 20E. Lengthening the season to include August did increase harvest during some years indicating that when the bear season coincided with caribou season it increased bear harvest. These results indicate that it is probably not the bear regulations themselves but that a combination of bear regulations and a willingness of caribou/moose hunters to harvest bears incidental to other hunts that will have the greatest effect on bear harvest.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Provide maximum opportunity to hunt grizzly bears in Unit 20E.

MANAGEMENT OBJECTIVES

- Manage for temporary reductions in the grizzly bear population or to reduce bear predation where it may be limiting moose population growth (e.g., moose populations are below food-limiting densities with autumn calf:cow ratios <25:100).

- After moose populations increase to desired levels, reduce bear harvests to allow for bear population stabilization or recovery.

When developing grizzly bear and wolf management goals and objectives for Unit 20E, I also considered the management goals and objectives of the area's moose and caribou populations. Area moose populations are currently limited by predation and grizzly bears are the primary predator on newborn moose calves (Gasaway et al. 1992). Grizzly bears are also an important predator on newborn caribou calves (Boertje and Gardner 1999). Combining predator and ungulate population and harvest objectives in Unit 20E is necessary now that the Alaska Board of Game designated the moose population in most of Unit 20E and the Fortymile

caribou herd as important for high levels of human consumptive use. Under the intensive management law, the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because a population is depleted or has reduced productivity. In the future the intensive management law may direct Unit 20E's grizzly bear population and harvest management objectives.

METHODS

Grizzly bears harvested in Unit 20E must be sealed within the unit or at Tok before being transported out of the area. During the sealing process, we determine the sex of the bear, measure the length and width of the skull, extract a premolar tooth, and collect information on date and location of harvest and time spent afield by the hunter. Premolar teeth were sent to Matson's Laboratory (Milltown, Montana USA) for age determination. Harvest data were summarized by regulatory year.

In summer 2000 we established 3 permanent sampling areas to assess annual berry abundance in Unit 20E and 5 sampling areas in Unit 12. Each area has 5 1-m^2 plots. Sample areas and individual plots were selected by the presence of blueberry plants and included a variety of habitat types, aspects, elevations, and slopes. We monitored annual rainfall at each site to assess variability of blossom and berry production. We measured berry production by counting the number of berries within each plot at the same time each year. Our objective is to evaluate the relationships between annual berry abundance and bear harvest and the number of problem bear incidents.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

I estimated the autumn 2000 Unit 20E population at 475–550 bears (17.1–19.8 bears of all ages/1000 km^2, 44.3–51.3/1000 mi^2) and that the population trend was stable (Gardner 2001). My estimate was based on radiotelemetry data collected by Boertje et al. (1987), Unit 20E harvest statistics collected since 1977, and bear harvest and population trend data collected from an intensively hunted grizzly bear population in the central Alaska Range (Reynolds and Boudreau 1992). Since there were no substantial weather events or change in harvest during RY00–RY02, I believe the Unit 20E grizzly bear population size has remained stable, numbering 475–550 bears.

Reynolds and Boudreau (1992) found that a 6% mortality rate of adult females ≥6-years old resulted in a grizzly bear population decline. In addition, Reynolds (1990) reported that an overall harvest of 11% for 8 years resulted in a population decline of 32%. Human-caused mortality included hunter kills, illegal kills, and wounding losses. Additionally, natural deaths accounted for about 2% annual mortality.

Grizzly bear hunting regulations in Unit 20E were liberalized in 1982 with the intent to reduce the bear population. Since 1982, annual harvests were within sustainable levels in Unit 20E as a whole. However during the 1980s and early 1990s, in that portion of Unit 20E that includes the Dennison, Middle, West, and Mosquito Forks of the Fortymile River and the

upper Charley River drainages (3670 mi^2; 9500 km^2), the harvest rate was 6–9% of the estimated population, including harvest rates of 8–20% of the female bears >5-years old.

Using Reynolds and Boudreau (1992) sustainable mortality rates for females and all bears, I estimated that grizzly bear numbers within this area declined by 2% annually between 1982 and 1988. The population probably remained stable during 1989 through 1991 but declined by 2% annually between 1992 and 1996, again due to high harvest rates (harvest density = 8.3/10,000 mi^2, 3.2/10,000 km^2). During RY97–RY01 the population was probably stable. In the remainder of Unit 20E (about 7000 mi^2; 18,000 km^2), harvest remained low (harvest density = 0.44/10,000 mi^2 or 0.17/10,000 km^2) and probably had no effect on population trend.

Taken independently, specific harvest statistics indicate that the Unit 20E bear population initially declined as a result of increased harvest. Kill rate data and relationship of percent males in the harvest to age class (Fraser et al. 1982) indicated that the bear population in the high harvest area was heavily harvested following the change in regulations (t = 0.001). Average male skull size during the period of increased harvest (RY82–RY88) was significantly smaller compared to the 5 regulatory years before the increase (t = 0.0003; Table 1), and the trend showed an increased presence of younger males (P = 0.059). These trends indicate that as large males were harvested, increased immigration of young males probably occurred. In contrast, skull size and age of harvested females did not change between the 2 periods. It is unlikely that increased presence of young males in the harvest was due to increases in recruitment of young males because there was no evidence of increased recruitment of young females. These data indicate that harvest can result in a decline of an Interior Alaska grizzly bear population, primarily by reducing the number of resident adult males.

During the report period, harvest was 19 bears in RY00 and 11 in RY01. Harvest was distributed throughout the unit. Harvest totals were below or near sustainable levels and were estimated to have no effect on population trend.

MORTALITY

Harvest

Season and Bag Limit.

Unit and Bag Limit	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 20E, 1 bear every regulatory year.	10 Aug–30 Jun (General hunt only)	10 Aug–30 Jun

A bear taken in this unit did not count against the bag limit of 1 bear every 4 years in other units; however, no person could take more than 1 bear, statewide, per regulatory year. During the report period a $25 resident tag fee was required to hunt grizzly bears in Unit 20E.

Alaska Board of Game Actions and Emergency Orders. No regulatory changes for grizzly bears in Unit 20E occurred during the report period. Since 1996 the board has waived the grizzly bear tag fee in northern Unit 20D in an attempt to increase harvest; this action may affect the grizzly bear population in adjacent portions of Unit 20E. Based on harvest distribution in Unit 20D, this regulatory change has had little effect on Unit 20E grizzly bears (DuBois, ADF&G, personal communication).

During each open board cycle since 1992, the Upper Tanana–Fortymile and Eagle advisory committees have proposed to eliminate the resident tag fee in Unit 20E in an attempt to increase bear harvest to benefit moose. Both committees believed that because moose in most of Unit 20E and the Fortymile caribou herd must be intensively managed (1998 Board of Game decision), additional grizzly bear hunting opportunity is needed. However, the board rejected these proposals because there was no evidence that eliminating the resident tag fee would increase moose calf survival and therefore eliminating the resident tag fee would not meet the legislative intent for use of this regulation (ADF&G 1998).

In spring 2000 the Board of Game substantially liberalized the Fortymile caribou bag limit across the herd's range. This regulation became effective in autumn 2001. Grizzly bears are often killed opportunistically by caribou and moose hunters. Therefore, increased caribou hunting opportunity may also increase grizzly bear harvest, especially in Unit 20E along the Taylor Highway and its associated trails and in Unit 25C, south and east of the Steese Highway.

In spring 2002 the board adopted a regulation eliminating the resident grizzly bear tag fee in Unit 20E, excluding Yukon–Charley Rivers National Preserve. The board wished to determine: 1) whether increased number of caribou and moose hunters would increase the grizzly bear harvest; 2) if grizzly bear harvest increased whether it would result in a population decline or change in composition; and 3) if harvest did alter the bear population, whether it would result in an increase in moose calf survival. Data collected during RY02–RY05 will be compared to previous years to evaluate the effects of the resident tag fee and number of moose and caribou hunters on grizzly bear harvest.

Hunter Harvest. During the report period, hunters reported taking 18 bears in RY00 and 11 in RY01 (Table 2). The 5-year average harvest was 11 bears. The mean percentage of males taken in the harvest during the past 5 years in Unit 20E was 58%. During RY00 and RY01, males represented 56% and 73% of the harvest, respectively.

Grizzly bear harvests increased substantially in RY82 (P = 0.001) compared with harvest totals during RY77 through RY81. Harvests remained high until RY88 (average annual harvest = 18.9) in response to the combination of more liberal seasons, bag limits, and a public awareness campaign. The annual number of moose and caribou hunters during that period was 330–1326 ($\bar{x}$ =794). Autumn grizzly bear harvests significantly declined between RY89 and RY95 ($\bar{x}$ = 10.9) compared to RY83–RY88 (P = 0.003) even though hunting

regulations remained liberal and number of potential hunters significantly increased ($\bar{x}$ = 1675 hunters; P = 0.0008). This indicated the number of legal bears in the more accessible areas of Unit 20E may have declined, were less vulnerable to harvest, or hunter desire for a Unit 20E grizzly was reduced. During RY96–RY00 the number of moose and caribou hunters declined significantly compared to RY89–RY95 (P = 0.0006) because of changes in caribou seasons and harvest limits, but grizzly bear harvest remained consistent ($\bar{x}$ = 12/yr).

Reynolds (ADF&G, unpublished data) found that timing the grizzly bear season to encompass the period most caribou hunters were afield in Unit 20A coincided with higher grizzly bear harvests. However, I found no relationship in Unit 20E between grizzly bear harvest and the number of moose, caribou, and total hunters afield (r^2 = 0.02–0.06). The trend indicated that grizzly bear harvest may decline slightly with more hunters, indicating that bears may become less vulnerable with large numbers of hunters afield.

It appears that a large number of big game hunters in the field does not necessarily result in an increase in bear harvest. The variables that differed between RY83–RY88 and RY89–RY95 are 1) the resident tag fee was required during RY89–RY95 but not during RY83–RY88, 2) there was greater publicity and novelty of taking a bear for moose management during RY83–RY88 but not during RY89–RY95, and 3) proliferation of areas with a bag limit of 1 bear/year and resident tag fee waivers likely reduced hunters' interest in any one area. The resident tag fee was not required during autumn RY02 and the harvest was 12 grizzly bears. The average autumn harvest during RY91–RY01 when the tag fee was required was 11.7 bears. Based on hunter interviews, it appeared that many hunters did not know the resident tag fee had been rescinded. A grizzly bear harvest regulation awareness campaign would help determine whether greater public knowledge will cause an increase in bear harvest.

Hunter Residency and Success. Resident hunters took 78% and 100% of the grizzly bear harvest in RY00 and RY01 (25 bears taken by residents/4 taken by nonresidents), compared with the 5-year average of 79% (Table 3). Historically, little guided hunting for grizzly bears occurred in Unit 20E. Nonresidents, accompanied by second-degree of kindred residents, took a few bears while hunting moose or caribou. Since 1995, Unit 20E guides have taken more nonresident grizzly bear hunters to remote portions of the unit, which accounts for 1–3 bears/year.

Harvest Chronology. During the past 12 years, 78% of grizzly bears were harvested during August and September when moose and caribou hunters were afield in Unit 20E (Table 4). Few bears were taken in the spring.

Transport Methods. During RY00 and RY01, airplanes were used by 48% (14/29) of successful grizzly bear hunters in Unit 20E (Table 5). During the previous 5 years, airplanes (56%), highway vehicles/walk (20%), and 3- or 4-wheelers (13%) were the modes of transportation used by most successful bear hunters. Use of airplanes by successful grizzly bear hunters in Unit 20E has increased as more big game hunters access the more remote areas to hunt.

Other Mortality

One bear (a female) was reported taken in defense of life or property (DLP) during this report period. Possible reasons for the lack of reported DLP kills in recent years were 1) the long season (only closed during 1 Jul–9 Aug) so that problem bears were killed by licensed hunters and 2) bear numbers in the vicinity of communities have probably been reduced.

Most nonhunting-caused grizzly bear mortality in Unit 20E is likely the result of intraspecific strife and cannibalism (Boertje et al. 1987). Reynolds (1997) estimated natural mortality at 2.5% for females ≥2 years of age and 1.9% for females ≥6 years of age.

HABITAT

Assessment

All of Unit 20E is suitable grizzly bear habitat. Few human developments exist, except the Taylor Highway and the small communities of Eagle, Boundary, and Chicken. The unit offers a variety of forbs and berries for grizzly bears. However, there are no arctic ground squirrels and few opportunities for salmon, which are known to be important food sources elsewhere. Habitat diversity is improving because implementation of the *Alaska Interagency Fire Management Plan* during the early 1980s allows wildfires and prescribed burns to occur on hundreds of thousands of acres. Average home range sizes for adult male and female bears are 1409 km^2 (544 mi^2, s = 695) and 391 km^2 (151 mi^2, s = 318.3), respectively (Boertje et al. 1987).

We established 3 blueberry sample areas in Unit 20E and 5 sample areas in Unit 12 during July 2000 (Table 6). Two years of data are presented in Table 7. These data and discussions with local berry pickers, hunters, and hikers, indicate that in 2000 blueberries were sparse overall but locally abundant. Blueberries were more abundant in all habitats in 2001. Unfortunately, we were not able to sample during 2002 but our objective is still to monitor berry production annually in these areas of Units 20E and 12 and to evaluate the effects of berry abundance on bear harvest and problem bear incidents.

Enhancement

The Alaska Interagency Fire Management Plan: Fortymile Area was implemented in the early 1980s and dictates that over 60% of the area will receive only limited fire suppression. Fires in this area will be monitored but not suppressed except under exceptionally severe fire conditions. Recurring wildfires increase habitat heterogeneity and productivity for bears and their primary prey. During summers 2001 and 2002, fire activity was low in Unit 20E and <30,000 acres burned each year. We conducted 3 prescribed fires during summers 1998 and 1999, burning about 95,000 acres. Two of these areas were dominated by climax spruce forest and one by decadent willow–birch–alder shrub. Based on range recovery in adjacent burns, grizzly bears will likely benefit from these fires within 10–15 years. No additional prescribed burns are planned for Unit 20E during RY03 and RY04.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Research in Unit 20E and other parts of Alaska demonstrated that grizzly bear and wolf predation can be the primary limiting factor in moose and caribou population growth (Gasaway et al. 1992). Altering wolf and bear predation simultaneously was recommended by Gasaway et al. (1992) to achieve maximum potential to increase moose numbers. Grizzly bear harvest regulations were liberalized in Unit 20E in 1981 with the intent of reducing the bear population to benefit moose. This led to a reduction in the bear population and a change in the sex and age composition in a portion of Unit 20E. Initial analyses demonstrated that survival of neonatal moose increased substantially after 8 years of increased grizzly bear harvest and an estimated 2% annual decline in the bear population (Gasaway et al. 1992). However, subsequent analysis indicated that further reductions in grizzly bear numbers did not improve moose calf survival in Unit 20E (Gardner 1999).

A nonlethal wolf control program was conducted in portions of Unit 20E during 1997 through May 2001. Wolf numbers were reduced by 75–80% within 15 wolf territories through translocation, sterilization, and take by trappers. Six of these wolf pack territories were in the area where grizzly bear numbers were also reduced by harvest. During 1998 through November 2002, I conducted moose population estimation surveys within a portion of the area where wolf and grizzly bear populations have been reduced. As of November 2000, moose numbers have remained relatively stable. Moose composition data indicate that calf survival to 5-months old remained low (14–23 calves/100 cows) and yearling bull survival was average to high (9–18/100 cows). It appears that grizzly bear predation may still be responsible for mortalities of a high proportion of the calves, but the effect of wolf predation may have been reduced (Gardner, ADF&G, unpublished data).

I presented hypotheses explaining the status and trend of Unit 20E's moose population and the effects of grizzly bear and wolf predation based on output from McNay and DeLong's (1998) pred–prey model (Gardner 2001). In brief, I concluded that 1) the Unit 20E moose population continues to be limited primarily by grizzly bear predation on calves, 2) the effects of nonlethal wolf control will be minimal, 3) high grizzly bear harvests in concentrated areas during the early 1980s may have reduced adult moose mortality but calf mortality was not substantially reduced, and 4) moose numbers would increase if grizzly bear numbers or their predation efficiency on moose calves was reduced.

To reduce the effects of grizzly bear predation on calves, either the number of bears would have to be reduced to a level at which predation is no longer a factor, or bear efficiency as a predator on calves would have to be reduced. My observations during calf mortality studies and moose composition data collected in areas of reduced grizzly bear numbers indicate a reduced population of bears is capable of killing the same number of calves, resulting in the same overall calf mortality rate when compared to the periods when bear numbers were not reduced. Boertje et al. (1988) reported that there were no differences in calf moose kill rates between sex and age classes of grizzly bears. These data indicate restricting harvest to males and females not accompanied by cubs may not reduce the bear population sufficiently to override the predation efficiency and compensatory abilities of the remaining bears. To reduce bear predation efficiency, other methods would be necessary. Bear predation efficiency declined in early successional habitats following wildfires (Schwartz and

Franzmann 1989). Combining liberal grizzly bear harvests with habitat enhancement programs may provide a means of increasing moose calf survival until other methods of publicly acceptable bear population control are found.

During RY02–RY05 we will conduct a management experiment to monitor the effects of liberal grizzly bear hunting regulations on grizzly bear harvest, the sex and age composition of the grizzly bear harvest, and moose calf:cow ratios in the areas where most grizzly bear harvest occurred.

CONCLUSIONS AND RECOMMENDATIONS

In autumn 2002 I estimated there were 475–550 grizzly bears in Unit 20E. Harvest data indicated the population declined only slightly since 1981 despite very liberal hunting regulations. Due to the inaccessibility of most of the unit, harvest had little impact on the total population size. However, in the central portion of Unit 20E, harvest increased significantly in RY82 and remained high until RY89. Harvest was also high between RY93 and RY96. Annual kill densities were 1.92–4.35 bears/10,000 mi^2 (0.74–1.68/10,000 km^2). Bear numbers within this area declined by an estimated 2% annually. Since 1994, harvest has become more dispersed across the unit. Population trend is currently stable.

Grizzly bear management in Unit 20E provides maximum bear hunting opportunity, which meets our management goal. Preliminary analyses indicate that increased numbers of moose and caribou hunters did not result in increased grizzly bear harvest. We did not meet our management objective to increase moose or caribou calf survival by reducing the grizzly bear population using liberalized harvest regulations. We are conducting a management experiment to see if more liberal grizzly bear harvest regulations (resident tag fee exemption in combination with long seasons and a liberal bag limit) in conjunction with high numbers of moose and caribou hunters will increase bear harvest and result in reduced bear numbers or changes in the population's sex and age composition. We will attempt to determine whether the grizzly bear population declines and if so, whether moose calf survival increases. To improve the success of this management experiment, we will attempt to better inform the hunting public of bear hunting opportunities in Unit 20E.

LITERATURE CITED

ALASKA DEPARTMENT OF FISH AND GAME. 1998. Resident brown bear bag limits and tag fees. Report to the Board of Game, October 23, 1998. ADF&G files. Juneau, Alaska, USA.

BOERTJE R.D. AND C. GARDNER. 1999. Reducing mortality on the Fortymile caribou herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-27-2. Study 3.43. Juneau, Alaska, USA.

———, W.C. GASAWAY, D.V. GRANGAARD, D.G. KELLEYHOUSE, AND R.O. STEPHENSON. 1987. Factors limiting moose population growth in Subunit 20E. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Project W-22-5. Job 1.37. Juneau, Alaska, USA.

———, ———, D.G. KELLEYHOUSE, AND D.V. GRANGAARD. 1988. Predation on moose and caribou by radiocollared grizzly bears in east-central Alaska. *Canadian Journal of Zoology* 66:2492–2499.

FRASER D.J., F. GARDNER, G.B. KOLENOSKY, AND S. STRATHERN. 1982. Estimation of harvest rate of black bears from age and sex data. *Wildlife Society Bulletin* 10(1):53–57.

GARDNER C. 1993. Unit 20E brown bear. Pages 212–220 *in* SM Abbott, editor. Brown bear management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-23-4 and W-23-5. Study 4.0. Juneau, Alaska, USA.

———.1995. Unit 20E brown bear. Pages 211–234 *in* MV Hicks, editor. Brown bear management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-24-1 and W-24-2. Study 4.0. Juneau, Alaska, USA.

———. 1999. Unit 20E brown bear. Pages 221–238 *in* MV Hicks, editor. Brown bear management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-24-5 and W-27-1. Study 4.0. Juneau, Alaska, USA.

———. 2001. Unit 20E brown bear. Pages 229–245 *in* C Healy, editor. Brown bear management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-27-2 and 3. Project 4.0. Juneau, Alaska, USA.

GASAWAY W.C., R.D. BOERTJE, D.V. GRANGAARD, D.G. KELLEYHOUSE, R.O. STEPHENSON, AND DG LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120.

MCNAY M.E. AND R.A. DELONG. 1998. Development and testing of a general predator–prey computer model for use in making management decisions. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-24-1 and W-24-5. Study 1.46. Juneau, Alaska, USA.

REYNOLDS H.V. 1990. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grant W-23-2. Study 4.19. Juneau, Alaska, USA.

———. 1997. Effects of harvest on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-24-1, W-24-2, W-24-3, and W-24-4. Study 4.25. Juneau, Alaska, USA.

——— AND T.A. BOUDREAU. 1992. Effects of harvest rates on grizzly bear population dynamics in the northcentral Alaska Range. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Grants W-22-5, W-22-6, W-23-1, W-23-2, W-23-3, and W-23-4. Study 4.19. Juneau, Alaska, USA.

SCHWARTZ C.C. AND A.W. FRANZMANN. 1989. Bears, wolves, moose, and forest succession, some management considerations on the Kenai Peninsula, Alaska. *Alces* 25:1–11.

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TABLE 1 A comparison of male skull size and harvest density in the pretreatment versus treatment periods

Test	Hypothesis[a]	Pretreatment	Treatment	*t*-test	Interpretation
Harvest density	H_O: Pre=Treat	5	16	0.0003	Harvest density > during treatment.
	H_A: Pre<Treat			0.0001	Satterthwaite correction.
Male skull size	H_O: Pre=Treat	5	16	0.0003	Male skull size > during pretreatment.
	H_A: Pre<Treat			0.0095	Satterthwaite correction.

[a] Pre=Treat, pretreatment sample is not different from the treatment or intensive harvest sample; Pre<Treat, pretreatment sample is less than the treatment or intensive harvest sample.

TABLE 2 Unit 20E grizzly bear mortality, regulatory years 1989–1990 through autumn 2002

Regulatory year	Reported							Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M (%)	F (%)	Unk	Total
1989–1990													
Autumn 1989	4	2	0	6	0	0	0	0	0	4 (67)	2 (33)	0	6
Spring 1990	3	1	0	4	0	0	0	0	0	3 (75)	1 (25)	0	4
Total	7	3	0	10	0	0	0	0	0	7 (70)	3 (30)	0	10
1990–1991													
Autumn 1990	7	3	0	10	0	0	0	0	0	7 (70)	3 (30)	0	10
Spring 1991	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	9	4	0	13	0	0	0	0	0	9 (69)	4 (31)	0	13
1991–1992													
Autumn 1991	2	4	0	6	0	0	0	0	0	2 (33)	4 (67)	0	6
Spring 1992	3	2	0	5	0	0	0	0	0	3 (60)	2 (40)	0	5
Total	5	6	0	11	0	0	0	0	0	5 (45)	6 (55)	0	11
1992–1993													
Autumn 1992	7	3	1	11	0	0	0	0	0	7 (64)	3 (27)	1	11
Spring 1993	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	9	4	1	14	0	0	0	0	0	9 (64)	4 (29)	1	14
1993–1994													
Autumn 1993	9	10	0	19	0	0	0	0	0	9 (47)	10 (53)	0	19
Spring 1994	0	2	0	2	0	0	0	0	0	0 (0)	2 (100)	0	2
Total	9	12	0	21	0	0	0	0	0	9 (43)	12 (57)	0	21
1994–1995													
Autumn 1994	6	4	0	10	0	0	0	0	2	8 (75)	4 (25)	0	12
Spring 1995	1	0	0	1	0	0	0	0	0	1 (100)	0 (0)	0	1
Total	7	4	0	11	0	0	0	0	2	9 (69)	4 (31)	0	13
1995–1996													
Autumn 1995	6	8	0	14	0	0	0	0	0	6 (43)	8 (57)	0	14
Spring 1996	5	2	0	7	0	0	0	0	0	5 (71)	2 (29)	0	7
Total	11	10	0	21	0	0	0	0	0	11 (52)	10 (48)	0	21
1996–1997													
Autumn 1996	8	10	0	18	0	0	0	0	1	9 (47)	10 (53)	0	19
Spring 1997	2	2	0	4	0	0	0	0	0	2 (50)	2 (50)	0	4
Total	10	12	0	22	0	0	0	0	1	11 (48)	12 (52)	0	23

Regulatory year	Reported							Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]								
	M	F	Unk	Total	M	F	Unk	Unreported	Illegal	M (%)	F (%)	Unk	Total
1997–1998													
Autumn 1997	7	4	0	11	0	0	0	0	1	7 (58)	4 (33)	1	12
Spring 1998	0	0	0	0	0	0	0	0	0	0 (00)	0 (00)	0	0
Total	7	4	0	11	0	0	0	0	1	7 (58)	4 (33)	1	12
1998–1999													
Autumn 1998	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12
Spring 1999	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	6	5	0	11	1	0	0	0	0	7 (58)	5 (42)	0	12
1999–2000													
Autumn 1999	0	2	0	2	0	0	0	0	0	0 (0)	2 (100)	0	2
Spring 2000	2	1	0	3	0	0	0	0	0	2 (67)	1 (33)	0	3
Total	2	3	0	5	0	0	0	0	0	2 (40)	3 (60)	0	5
2000–2001													
Autumn 2000	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19
Spring 2001	0	0	0	0	0	0	0	0	0	0 (0)	0 (0)	0	0
Total	10	8	0	18	0	1	0	0	0	10 (53)	9 (47)	0	19
2001–2002													
Autumn 2001	6	3	0	9	0	0	0	0	0	6 (67)	3 (33)	0	9
Spring 2002	2	0	0	2	0	0	0	0	0	2 (100)	0 (0)	0	2
Total	8	3	0	11	0	0	0	0	0	8 (73)	3 (27)	0	11
2002[b]													
Autumn 2002	6	6	0	12	0	0	0	0	0	6 (50)	6 (50)	0	12

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.
[b] Preliminary harvest.

TABLE 3 Unit 20E residency of successful grizzly bear hunters, regulatory years 1989–1990 through autumn 2002

Regulatory year	Resident	(%)	Nonresident	(%)	Unknown	(%)	Total successful hunters
1989–1990	9	(90)	1	(10)	0	(0)	10
1990–1991	12	(92)	1	(8)	0	(0)	13
1991–1992	11	(100)	0	(0)	0	(0)	11
1992–1993	12	(86)	2	(14)	0	(0)	14
1993–1994	20	(95)	1	(5)	0	(0)	21
1994–1995	8	(73)	2	(18)	1	(9)	11
1995–1996	9	(43)	9	(43)	3	(14)	21
1996–1997	21	(91)	2	(9)	0	(0)	23
1997–1998	9	(82)	2	(18)	0	(0)	11
1998–1999	8	(73)	3	(27)	0	(0)	11
1999–2000	3	(60)	2	(40)	0	(0)	5
2000–2001	14	(78)	4	(22)	0	(0)	18
2001–2002	11	(100)	0	(0)	0	(0)	11
Autumn 2002[a]	11	(91)	1	(9)	0	(0)	12

[a] Preliminary harvest.

TABLE 4 Unit 20E chronology of brown bear harvest by month, regulatory years 1989–1990 through autumn 2002

Regulatory year	Harvest by month														
	Aug	(%)	Sep	(%)	Oct	(%)	Nov	(%)	Apr	(%)	May	(%)	Jun	(%)	*n*
1989–1990	1	(10)	5	(50)	0	(0)	0	(0)	1	(10)	2	(20)	1	(10)	10
1990–1991	2	(15)	7	(54)	0	(0)	0	(0)	0	(0)	3	(23)	1	(8)	13
1991–1992	3	(27)	2	(18)	1	(9)	0	(0)	0	(0)	1	(9)	4	(36)	11
1992–1993	4	(29)	5	(36)	2	(14)	0	(0)	0	(0)	1	(7)	2	(14)	14
1993–1994	6	(29)	12	(57)	1	(5)	0	(0)	1	(5)	1	(5)	0	(0)	21
1994–1995	2	(15)	10	(77)	0	(0)	0	(0)	0	(0)	0	(0)	1	(8)	13
1995–1996	3	(14)	10	(48)	0	(0)	0	(0)	1	(5)	6	(29)	1	(5)	21
1996–1997	7	(30)	12	(52)	0	(0)	0	(0)	0	(0)	2	(9)	2	(9)	23
1997–1998	2	(18)	9	(82)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	11
1998–1999	5	(45)	6	(55)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	11
1999–2000	0	(0)	2	(40)	0	(0)	0	(0)	0	(0)	3	(60)	0	(0)	5
2000–2001	3	(17)	15	(83)	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	18
2001–2002	2	(18)	7	(64)	0	(0)	0	(0)	1	(9)	0	(0)	1	(9)	11
Autumn 2002[a]	3	(25)	9	(75)	0	(0)	0	(0)							12
Totals	43	(22)	111	(57)	4	(2)	0	(0)	4	(2)	19	(10)	13	(7)	194

[a] Preliminary harvest.

TABLE 5 Unit 20E grizzly bear percent harvest by transport method, regulatory years 1989–1990 through autumn 2002

Regulatory year	Percent harvest by transport method									*n*
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
1989–1990	40	0	10	0	0	0	20	20	10	10
1990–1991	23	0	15	8	0	0	46	0	8	13
1991–1992	27	0	9	18	0	0	36	9	0	11
1992–1993	43	0	0	21	0	7	29	0	0	14
1993–1994	29	0	10	14	0	19	5	24	0	21
1994–1995	23	0	8	31	0	8	15	15	0	13
1995–1996	57	0	10	10	0	4	4	10	4	21
1996–1997	43	4	0	9	0	9	26	9	0	23
1997–1998	45	0	0	45	0	0	0	10	0	11
1998–1999	73	0	0	0	0	18	0	9	0	11
1999–2000	60	0	0	0	0	0	40	0	0	5
2000–2001	44	0	11	33	0	0	11	0	0	18
2001–2002	55	0	9	36	0	0	0	0	0	11
Autumn 2002[a]	17	0	8	33	0	17	8	17	0	12

[a] Preliminary harvest.

TABLE 6 Blueberry sample areas in Units 12 and 20E

Area	Unit	Elevation	Aspect	Slope	Primary vegetation
Clearwater	12	1966	Flat	Flat	spruce/muskeg
7-Mile	12	1859	Flat	Flat	spruce/willow
Pipeline	12	1888	5–10[a]	SSW	spruce/willow
RCA	12	2197	15–20[a]	N	spruce/alder
4-Mile	12	2300	5–10[a]	S	spruce/tussock
9-Mile	20E	2722	5–10[a]	NE	1990 burn/willow
Ptarmigan	20E	3643	10–15[a]	W	willow/alder
Fairplay	20E	3640	10[a]	SW	willow

TABLE 7 Blueberry production in 8 sample units in Units 12 and 20E, 2000–2002

Calendar year	Sample units[a]										Bear harvest[b]	DLP[b,c]
	Clearwater		7-Mile		Pipeline		RCA		4-Mile			
2000	137	(33.6)	3	(0.89)	19	(5.76)	7	(1.95)	55	(2.55)	18	1
2001	285	(64.36)	23	(4.34)	278	(55.86)	23	(3.13)	356	(36.09)	11	0
2002[d]											12	0

Calendar year	9-Mile		Fairplay Ptarmigan		Fairplay 2	
2000	51	(6.30)	124	(24.31)	46	(9.42)
2001	400	(26.24)	379	(79.05)	599	(109.69)

[a] Mean number of berries/sample unit. Each sample unit included 5 1-m^2 plots; numbers in parentheses is the variance among plots within a study area.
[b] Unit 20E only.
[c] Number of bears killed in defense of life or property (DLP) also includes bears harvested in Jul.
[d] No berry data collected in summer 2002.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 21B, 21C, and 21D (20,655 mi^2)

GEOGRAPHIC DESCRIPTION: Middle Yukon River, including lower Koyukuk River, lower Nowitna River and Melozitna River drainages

BACKGROUND

Grizzly bear density is low (10 bears/1000 mi^2) to moderate (25 bears/1000 mi^2) throughout Units 21B, 21C, and 21D, with highest densities in the mountainous areas. Available information indicates that populations have been stable or slowly increasing. Annual reported harvest was <10 bears per year with an estimated additional human-caused mortality of 10 bears per year that were unreported and probably a result of bear–human conflicts. Unreported kills most likely occurred along the Yukon River during the summer and early fall when fish camps were in operation and bears were attracted to the sites.

Historically, grizzly bears were an important source of food and hides, but hunting effort by local residents has declined in recent years. The registration regulations and fee exemption for the Northwest Alaska Brown Bear Management Area, which includes all of Unit 21D, did not improve harvest reporting among local residents.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Protect, maintain, and enhance the grizzly bear population and its habitat in concert with other components of the ecosystem.

MANAGEMENT OBJECTIVE

- Manage a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest.

METHODS

Harvest was monitored through sealing requirements of general hunts and reporting requirements of the Northwest Alaska Brown Bear Management Area subsistence hunts.

Sealing was not required in the Northwest Alaska Brown Bear Management Area hunts unless the hide was removed from the unit. Data collected during sealing included sex, location of harvest, skull measurements, and age if teeth were submitted for aging. Data specific to harvest such as transportation methods, time of harvest, and commercial services utilized were also recorded. Data collected from bears harvested under subsistence regulations were limited to sex, location of kill, and date of harvest. Bear–human conflicts were addressed through education, legal harvest of problem bears, and changes in regulations. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Field observations, nuisance reports, and hunter sightings indicated the population was stable or slowly increasing during the past 10 years. We did not conduct surveys in the area; however, we made population estimates based on known bear densities in similar habitats in other Interior Alaska game management units (Reynolds and Hechtel 1984; Reynolds 1989). Assuming 25 bears/1000 mi^2 in the highest density bear habitat and 10 bears/1000 mi^2 in the remainder of the reporting area, we estimated 350–400 grizzly bears inhabited Units 21B, 21C, and 21D (Woolington 1997) (21B≅50, 21C≅100, 21D≅200). In Unit 21D the best bear habitat is in the Nulato Hills. Unit 21C in its entirety contained the next best grizzly bear habitat. However, for both areas, density estimates were likely underestimated because the best habitat in this reporting area included salmon spawning streams that the referenced habitats were lacking (Miller 1993).

MORTALITY

Harvest

Seasons and Bag Limits.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 21B and 21C		
One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 21D		
One bear every regulatory year by registration permit.	1 Sep–15 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	1 Sep–15 Jun	1 Sep–15 Jun

Alaska Board of Game Actions and Emergency Orders. During the spring 1996 Alaska Board of Game meeting, Unit 21D was included within the Northwest Alaska Brown Bear Management Area. This regulation change allowed a bag limit of 1 bear every regulatory year

under a subsistence registration permit. This regulation also required salvage of meat for human consumption, but the hide and skull did not need to be sealed unless they were removed from the management area. If the hide was removed from the management area, the Alaska Department of Fish and Game took the skin of the head and the front claws. At the spring 2000 Board of Game meeting, the season was extended to 15 June for both the subsistence and general seasons in Unit 21D. The bag limit was also liberalized to allow for the harvest of 1 bear every year under the general hunt. No changes to grizzly bear regulations were adopted during the spring 2002 Board of Game meeting.

Hunter Harvest. Grizzly bear harvest in Units 21B, 21C, and 21D was low ($\bar{x}$ = 7.5 bears/yr), and no harvest patterns were clear over the last 6 regulatory years (Table 1). More than half the annual harvest was likely unreported. The number of bears taken and not reported was uncertain, but I estimated it was approximately 10 bears per year based on interviews and previously reported values. Most of the bears that were harvested but unreported were likely taken at fish camps. If this estimate was accurate, the combined mean annual harvest for the last 6 regulatory years was approximately 18 bears/year.

The age and sex composition of the reported harvest shows no indication of overexploitation. From RY96 through fall 2002, males composed 73% of the reported harvest, which was an adequate level to maintain recruitment. The percent of males in the harvest was up from 61% and 68% reported in the 1999 and 2001 Management Reports, respectively. For RY00–RY02 the average age of harvested bears was 10.1, slightly older than the 34-year average of 8.6 years of age for bears harvested in Units 21B, 21C, 21D, and 24.

Most grizzly bear harvest was in Unit 21D (Table 2) where the most moose hunting also occurs. Unit 21C sustained the second greatest harvest, which was supported by the relatively high density of bears in that area.

Hunter Residency and Success. Most grizzly bears were harvested opportunistically. Mean annual harvest over the past 4 regulatory years was 2.0 bears for local hunters, 1.5 for nonlocals, and 8.8 for nonresidents (Table 3). From RY92 through fall 2002 the mean annual number of successful hunters was 6.9, and was unchanged from the previous management report.

Harvest Chronology and Transport Methods. Because harvest was low, sample sizes were not sufficient to show any a statistically significant patterns between harvest during the spring and fall. Spring bear hunters typically use snowmachines for transportation. Fall bear harvest is often incidental to moose hunting activity, and hunters typically use boats for transportation.

CONCLUSIONS AND RECOMMENDATIONS

We achieved the management objective to manage for a grizzly population that will sustain a 3-year mean annual harvest of at least 25 bears, with at least 50% males in the reported harvest. The 3-year mean annual harvest (reported and unreported) of 19.7 bears was below the harvest objective of 25 bears and the population was probably increasing. Formerly, data from other areas of Interior Alaska (DuBois 1989) estimated the sustainable harvest rate to be

5–6%, which suggested that an annual total harvest of at least 25 bears was sustainable in Units 21B, 21C, and 21D. The high proportion of males harvested in this management area make it likely that additional harvest can be accommodated. With the current population estimate of 350–400 bears, a sustainable annual harvest of 21–48 grizzly bears may be supported if the composition of males in the harvest remains at present levels. Because males continued to be harvested at more than twice the rate of females and the average age of harvested bears was relatively high, the population was most likely maintaining a high level of reproductive potential with a gradually maturing age-class structure. Although Miller (1993) cautioned about using the proportion of males in the harvest to determine the composition of the population, approximately half of the bears are harvested in the fall so the bias of a greater number of male bears in the spring harvest was diminished. Unless regulations or hunting habits change dramatically, the harvest will have a negligible effect on grizzly populations in these units. A more accurate assessment of the unreported harvest and a better estimate of the population size should be addressed in the next reporting period.

LITERATURE CITED

DUBOIS S.D. 1989. Unit 20D brown bear. Pages 119–127 *in* SO Morgan, editor. Brown bear management report of survey–inventory activities. Part V. Volume XIX. Alaska Department of Fish and Game. Grant W-23-1. Study 4.0. Juneau, Alaska, USA.

MILLER S. 1993. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-22-6, W-23-1, W-23-2, W-23-3, W-23-4, and W-23-5. Study 4.21. Juneau, Alaska, USA.

REYNOLDS H.V. 1989. Units 24, 25A, B, D, and 26B and C brown bear. Pages 174–184 *in* SO Morgan, editor. Brown bear management report of survey–inventory activities. Part V. Volume XIX. Alaska Department of Fish and Game. Grant W-23-1. Study 4.0. Juneau, Alaska, USA.

——— AND J.L. HECHTEL. 1984. Structure, status, reproductive biology, movements, distribution, and habitat utilization of a grizzly bear population. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-21-1, W-21-2, W-22-1, and W-22-2. Study 4.14R. Juneau, Alaska, USA.

WOOLINGTON J. 1997. Unit 21 brown bear. Pages 208–212 *in* MV Hicks, editor. Brown bear management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-24-3 and W-24-4. Study 4.0. Juneau, Alaska, USA.

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TABLE 1 Units 21B, 21C, and 21D brown bear mortality, regulatory year 1996 through fall 2002

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
1996–1997														
Fall 1996	2	1	0	3	1	0	0	1	5	0	3	1	5	9
Spring 1997	0	0	0	0	0	0	0	0	5	0	0	0	5	5
Total	2	1	0	3	1	0	0	1	10	0	3	1	10	14
1997–1998														
Fall 1997	4	2	3	9	0	0	0	0	5	0	4	2	8	14
Spring 1998	1	0	0	1	0	0	0	0	5	0	1	0	5	6
Total	5	2	3	10	0	0	0	0	10	0	5	2	13	20
1998–1999														
Fall 1998	2	2	0	4	0	0	1	1	5	0	2	2	6	10
Spring 1999	1	0	0	1	0	0	0	0	5	0	1	0	5	6
Total	3	2	0	5	0	0	1	1	10	0	3	2	11	16
1999–2000														
Fall 1999	2	1	0	3	0	0	0	0	5	0	2	1	5	8
Spring 2000	4	0	0	4	0	0	0	0	5	0	4	0	5	9
Total	6	1	0	7	0	0	0	0	10	0	6	1	10	17
2000–2001														
Fall 2000	8	1	0	9	0	0	0	0	5	0	8	1	5	14
Spring 2001	4	0	0	4	0	0	0	0	5	0	4	0	5	9
Total	12	1	0	13	0	0	0	0	10	0	12	1	10	23
2001–2002														
Fall 2001	1	3	0	4	0	0	0	0	5	0	1	3	5	9
Spring 2002	3	2	0	5	0	0	0	0	5	0	3	2	5	10
Total	4	5	0	9	0	0	0	0	10	0	4	5	10	19
2002–2003														
Fall 2002	1	0	0	1	0	0	0	0	5	0	1	0	5	6

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

TABLE 2 Unit 21 reported brown bear harvest by subunit, regulatory year 1992 through fall 2002[a]

Regulatory year	Unit			Total
	21B	21C	21D	
1992–1993	2	0	7	9
1993–1994	0	2	4	6
1994–1995	0	3	5	8
1995–1996	0	0	4	4
1996–1997	1	2	0	3
1997–1998	1	1	8	10
1998–1999	0	2	4	6
1999–2000	1	0	6	7
2000–2001	1	4	8	13
2001–2002	0	1	8	9
Fall 2002	0	0	1	1

[a] Nonhunting kill not included.

TABLE 3 Unit 21B, 21C, and 21D successful hunter residency, regulatory year 1992 through fall 2002

Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total successful hunters
1992–1993	2	1	6	9
1993–1994	2	2	2	6
1994–1995	2	3	3	8
1995–1996	2	0	2	4
1996–1997	1	2	0	3
1997–1998	4	1	5	10
1998–1999	2	1	3	6
1999–2000	2	2	3	7
2000–2001	1	3	9	13
2001–2002	3	0	6	9
Fall 2002[b]	0	0	1	1

[a] Units 21B, 21C, and 21D residents.
[b] Preliminary.

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 22 (25,200 mi^2)

GEOGRAPHICAL DESCRIPTION: Seward Peninsula and that portion of the Nulato Hills draining west into Norton Sound

BACKGROUND

We believe that brown bear numbers in Unit 22 declined during the early 1900s after the introduction of the gold mining and reindeer herding industries. The population did not begin to recover until these activities diminished substantially during the 1940s and federal predator control efforts ended at statehood in 1959 (Grauvogel, 1986). Since then, bear numbers have increased in most areas, presumably in response to conservative management policies, higher prey densities, and favorable environmental conditions.

Growth of the Unit 22 bear population has had many effects and consequences. There is considerable interest in hunting by residents, principally from the Nome area, and by nonresidents through general season and drawing permit hunts. Predation on moose calves is believed to be depressing moose populations in many parts of the unit. Human-bear encounters in the Nome area and in Unit 22 villages and camps are a serious concern to the public and many local residents believe that bear densities in Unit 22 are excessive. Since 1997, in response to public demand, brown bear hunting regulations have been incrementally liberalized to increase annual harvest and to attempt to reduce bear number in Unit 22.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain the population at levels estimated during the 1991 brown bear census in Unit 22.

Without census data since 1991 we have no means to compare current densities and evaluate the management goal. To remedy this situation, in May 2002, staff developed a measurable management goal based on harvest parameters:

- Maintain a population that sustains a 3-year mean annual reported harvest of at least 50% males.

The revised goal allows maximum opportunity for hunting brown bears in Unit 22, yet allows a method to measure change in population level. By developing a management goal based on harvest data we can evaluate our success in achieving and maintaining the goal.

MANAGEMENT OBJECTIVES

- Assess population trends through field observations and analyses of harvest data.
- Seal bear skins and skulls, determine sex and extract a tooth for aging from brown bears presented for sealing.
- Monitor the brown bear harvest through field observations, brown bear sealing reports, village harvest surveys, subsistence harvest questionnaires, interviews with successful hunters, and analyze data.
- Improve communication with the public to reduce illegal and unreported harvest, and improve understanding of defense of life and property situations.
- Provide opportunity for subsistence hunting of brown bears.
- Assist the public in dealing with nuisance bear problems.
- Educate the public about bear behavior and safety to minimize conflicts between bears and the public.
- Provide information to the Board of Game on brown bear management.

METHODS

Various methods were used to assess the bear population and to meet the management objectives in Unit 22. Population status was assessed from observations made during other wildlife surveys and fieldwork. Information was also gathered through general conversation with knowledgeable local residents. Bear hunting regulations were liberalized to increase hunting opportunity and attempt to slow population growth. Efforts were made to inform residents about regulation changes and to increase understanding of Defense of Life and Property (DLP) regulations. Bears were sealed by Nome staff and approved sealing agents in several Unit 22 villages. Harvest data were summarized from sealing certificates, harvest reports from nonresident drawing permits and subsistence registration permits, village-based big game harvest surveys and DLP reports. Problems with nuisance bears were addressed through public education and by working with Fish and Wildlife Protection and Village Public Safety Officers to deter or destroy problem bears. An electric fence bear exclosure was maintained as a demonstration project at a camp with a history of bear problems in the vicinity of Nome. Another fence was available for seasonal loan to people interested in experimenting with this method of avoiding bear problems.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

We believe grizzly bear numbers have increased throughout much of Unit 22 and densities are probably above those previously estimated. A census, completed during the early 1990s, estimated the brown bear population in eastern Unit 22B, Units 22C, 22D and 22E at 458 bears >2 years-old (density: 1 bear per 27 mi^2). The density estimate varied almost two-fold within the study area with the highest densities (1 bear per 20 mi^2) in the western portion of Unit 22B, and the lowest densities (1 bear per 39 mi^2) in the southern portion of Unit 22E (Miller and Nelson, 1993). Over the last decade observations by staff, guides and residents of Unit 22 indicate brown bear numbers have increased throughout much of the unit in spite of increasingly high harvests. Reports of bear encounters and complaints about nuisance bears were frequent and the take of DLP bears reached an all time high of 10 bears during the 2000–2001 regulatory year. Destruction of cabins and raids on subsistence food caches now occur in the westernmost parts of the unit where bears previously were seldom seen.

Population Composition

There were no activities to determine population composition in Unit 22 during the reporting period.

Distribution and Movements

There were no activities to determine distribution and movements in Unit 22 during the reporting period.

MORTALITY

Harvest

Season and Bag Limit.

Liberalized bear hunting regulations, adopted by the Board of Game in October 1999, went into effect at the beginning of this reporting period. The changes included elimination of the resident tag fee requirement throughout Unit 22 and an increase in the number of nonresident drawing permits from 20 to 27 in Units 22B/22C (Hunt DB685) and from 5 to 8 in Units 22D/22E (Hunt DB690).

2000–2001 and 2001–2002 Regulatory Year **Unit and Bag Limits**	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
Unit 22(A) **RESIDENTS & NONRESIDENTS:** One bear every 4 regulatory years	1 Sep–31 May	1 Sep–31 May

2000–2001 and 2001–2002 Regulatory Year **Unit and Bag Limits**	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
Unit 22(B) **RESIDENT HUNTERS:** One bear every 4 regulatory years	1 Sep–31 May	
NONRESIDENT HUNTERS: One bear every 4 regulatory years by drawing permit only. Up to 27 permits maybe issued in combination with Unit 22C.		1 Sep–31 May
Unit 22(C) **RESIDENTS:** One bear every 4 regulatory years	1 Sep–31 Oct 10 May–25 May	
NONRESIDENTS: One bear every 4 regulatory years by drawing permit only. Up to 27 permits maybe issued in combination with Unit 22B.		1 Sep–31 Oct 10 May–25 May
Unit 22(D) **RESIDENTS:** One bear every 4 regulatory years	1 Sep–31 May	
NONRESIDENTS: One bear every 4 regulatory years by drawing permit only. Up to 8 permits maybe issued in combination with Unit 22E.		1 Sep–31 May
Unit 22(E) **RESIDENTS:** One bear every 4 regulatory years	1 Sep–31 May	
NONRESIDENTS: One bear every 4 regulatory years by drawing permit only. Up to 8 permits maybe issued in combination with Unit 22D.		1 Sep–31 May
Units 22(A), 22(B), 22(D), 22(E) – Subsistence Hunt **RESIDENTS:** One bear per regulatory year by	1 Sep–31 May	

2000–2001 and 2001–2002 Regulatory Year **Unit and Bag Limits**	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
registration permit in the Northwest Alaska Brown Bear Management Area for subsistence purposes		
NONRESIDENTS:		No Open Season

Board of Game Actions and Emergency Orders. In November 2001, in response to public demand and concern about the effect of bear predation on Unit 22 moose populations, department staff recommended regulatory changes that were intended to further increase bear harvest in Unit 22. The Board adopted the following regulations effective during the 2002–2003 regulatory year: 1) the resident and nonresident general season bag limit for brown bears in Unit 22 was changed from 1 bear every 4 years to one bear every year except in Unit 22C where the bag limit remains 1 bear every 4 years; 2) the opening date for the general and subsistence season for residents and nonresidents was changed from Sept. 1 to Aug. 1; 3) Unit 22C was added to the Northwest Brown Bear Management Area, however the subsistence season dates in Unit 22C mirror general season dates and are Aug. 1–Oct. 31 and May 10–May 25; and 4) The number of nonresident brown bear drawing permits for Units 22D and 22E (Hunt DB690) was increased from 8 to 12. In March 2001 and 2002 the Board reauthorized the brown bear resident tag fee exemption in Unit 22.

Human-Induced Harvest. Harvest has increased substantially in the last 4 years (Figure 1) and remained high during this reporting period, averaging 94 bears per year. Since 1998 the average annual harvest was 95 bears, which is a 76% increase over the 1990–1997 average annual harvest of 54 bears. During the 2000–2001 regulatory year 104 bears were taken which was the highest annual harvest reported in Unit 22. In 2001–2002, 84 bears were taken (Table 1). Plentiful numbers of bears, increasingly liberal regulations, desire by local residents to reduce bear numbers, excellent snow conditions for hunting in the spring of 2001, and more nonresident hunters in Unit 22A where drawing permits are not required were contributing factors to the high harvests in recent years.

Since 1961, annual harvest of male bears has consistently exceeded the female harvest, with male bears averaging approximately 65% of the harvest. In the 2000–2001 regulatory year male bears comprised 68% of the harvest. However, during the 2001–2002 regulatory year only 54% of the harvest was male bears, which is the lowest percentage of males in the harvest since 1992. If we continue to see an increase in the proportion of female bears in the harvest, it may be an indication that harvest is impacting the population.

Since 1967, when Unit 22 age records began, the age of harvested bears has averaged 6.5 years annually. During this reporting period harvested bears averaged 6.7 years (6.4 in 2000 and 6.9 in 2001). The average age of harvested bears was consistently higher in the spring than in the fall until 2001 when the fall harvest averaged 7.6 years and the spring harvest

averaged 6.2 years. The fall hunt generally targets bears in the most accessible places where most of the older, larger bears have now been eliminated. Much of the harvest is by local recreational hunters who are not selective and shoot whatever bear first presents itself. Large bears are available for serious trophy hunters; 27 of 175 bears (15%) taken during this reporting period had skull sizes of 24 inches or larger. However, the number of record book bears was fewer than in the previous reporting period when 39 skulls (21% of the harvest) measured 24 inches or larger.

Thirteen bears were reported as DLP kills during the 2-year reporting period, 10 of which were taken in the 2000–2001 regulatory year (Table 1). These totals do not represent the actual number of non-hunting kills for the reporting period. Each year, we receive unverified reports of bears being shot and left unattended, or of not being sealed. The accuracy of these reports and the extent of illegal harvest are unknown. Nelson (1993) estimated that an additional 10 to 30 bears were killed annually and not reported in Unit 22.

In 2000–2001, 27 Unit 22 residents registered for the NWABBMA subsistence hunt and in 2001–2002, 43 people registered. No bears were harvested with a subsistence permit during this reporting period. In Unit 22 brown bears are seldom hunted for food and most people register so they may keep the hide and skull if they are forced to kill a bear under DLP circumstances.

Nome staff continued work on a community harvest assessment project with Subsistence Division and Kawerak Native Corporation in an attempt to better quantify unreported subsistence harvest of big game species, including brown bears, by village residents. During this reporting period the villages of Brevig Mission, Teller, Shishmaref, Wales and Golovin were surveyed. One bear taken by a Teller resident was reported.

Permit Hunts. During this reporting period 27 drawing permits were available annually to nonresident hunters in Units 22B and 22C in combination, and 8 permits were allocated to nonresidents in Units 22D and 22E in combination. A continuous season from 1 September – 31 May, except in Unit 22C, allowed drawing permit holders to hunt during either spring or fall. To increase opportunity for nonresidents, all qualified drawing permit applicants are maintained on alternate lists and permits are issued to alternates in ranked order if drawing permit winners decline their permits and chose not to hunt. Over-the-counter permits were issued both years when the alternate lists were exhausted.

Hunter Residency and Success. In Unit 22A, where nonresident drawing permits are not required and in Unit 22E where few residents hunt brown bear, the size of the nonresident harvest surpasses the resident harvest. In the remainder of the unit where nonresident effort has been restricted by a drawing permit quota, resident harvest normally exceeds the nonresident harvest (Table 2).

In 2000–2001 all 27 available nonresident drawing permits for Units 22B and 22C were issued, but in 2001–2002 only 22 of 27 available permits were issued. During this reporting period the nonresident success rate was 65% in Units 22B and 22C. In Units 22D and 22E all 8 available permits were issued annually and the success rate was 80%.

We cannot easily evaluate hunter effort and success for resident hunters under the present harvest reporting system because unsuccessful hunters are not required to report. However, it appears hunter success is normally higher in the spring, particularly when suitable snow conditions exist for snowmachine travel and tracking.

Harvest Chronology. In 2000–2001 67% of the harvest occurred in the spring and in 2001–2002 spring harvest was 56% of the total harvest (Table 3) Historically, more bears are taken during the spring season because bears are more easily observed and tracked, hunter effort is greater, and bears tend to be more accessible to hunters using snowmachines as transportation.

Transport Methods. The Nome road system makes it possible for bear hunters to use highway vehicles as the primary transportation for hunting or to use roads as access points for boats, 4-wheelers and snowmachines. In the fall 4-wheelers followed by boats and highway vehicles were used most frequently. Most hunters use snow machines in the spring. (Table 4). Aircraft use in the unit is primarily limited to registered guides moving clients in and out of camps. Transport methods other than airplanes are used from the camps.

Other Mortality

There were no observations of other mortality during the reporting period.

HABITAT

Assessment

There were no brown bear habitat assessment activities in Unit 22 during the reporting period.

Enhancement

There were no brown bear habitat enhancement activities in Unit 22 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Moose research in Unit 22B indicates that brown bear predation on moose calves reduces calf survival in western Unit 22B (Persons, 1998) and research in other parts of Alaska has shown that brown bear predation can be the primary factor in limiting moose population growth. Moose recruitment rates have declined to less than 10% in much of Unit 22 over the last 10 years, during which time bear numbers are believed to have increased. Anecdotal evidence suggests bear predation on adult moose, particularly in the spring, is common.

During much of the last decade winters were relatively mild and berry crops were noted to be particularly bountiful between 1995 and 1998. During this same time period informal and anecdotal evidence suggests productivity, litter sizes and cub survival were high. In 1998 and 1999 reliable reports of sows with 4 cubs came from 4 widely separate parts of the unit. In recent years there has been an abundance of bears of younger age classes that are often less

wary and more likely to inhabit accessible areas and to venture into areas of human habitation, resulting in bear/human conflicts.

A new education outreach specialist has been hired in Region 5. In Unit 22 one of the education priorities will be to improve public understanding of bear safety, bear behavior, bear hunting and DLP regulations and methods of minimizing bear/human conflicts.

CONCLUSIONS AND RECOMMENDATIONS

Over the last decade we believe Unit 22 brown bear numbers have increased above the density estimated in the bear census and research study reported in 1991. During the same period moose populations and recruitment rates have declined in most parts of the unit and we attribute current moose declines to be largely the result of bear predation on calves. As recommended in the previous progress report, we have maximized opportunity to hunt brown bears (except Unit 22C) in an attempt to reduce bear numbers. Although uncertain, the reduction of brown bear density may have the benefit of reducing bear predation on moose calves. In Unit 22C bears are already heavily harvested and the Unit 22C moose population is above our management goal.

The annual Unit 22 brown bear harvest has increased substantially over the last 4 years. The 1998–2001 harvest averaged 94 bears per year. This is a 74% increase in harvest above the 1990–1997 average harvest of 54 bears per year. High harvests resulted in no change in the age or sex composition of the harvest until 2001, when the female component increased to 46% (from an average of 35%) of the annual harvest. Although the proportion of females in the harvest remained relatively low, the number of females harvested increased as harvest increased. Removal of increased numbers of females may result in a population decline. If we continue to see a higher proportion of females in the harvest it may be an indication this is occurring.

We should strive for high harvest rates and reductions in the bear population only as long as necessary to rebuild moose populations that are limited by predation. If high harvests and annual harvests comprised of more than 50% female bears fail to result in improved moose recruitment, bear harvest should be reduced before the bear population is reduced to very low levels.

It is important to increase educational efforts aimed at understanding bear behavior, bear safety and minimizing bear/human conflicts, emphasizing the importance of clean camps and not leaving food, dog food, scraps or garbage unattended or accessible to bears. We should continue efforts to improve understanding of hunting and DLP regulations in the villages.

LITERATURE CITED

GRAUVOGEL, C.A. 1986. GMU 22 brown/grizzly bear survey-inventory progress report. Pages 46–56 in B. Townsend, ed. Annual report of survey-inventory activities. Part V. Brown/Grizzly Bear. Vol. XVII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W–22 4 and W–22–5. Job. 4.0 Juneau. 70pp.

MILLER, S.D. AND R.N. NELSON. 1993. A brown bear density and population estimate for a portion of the Seward Peninsula, Alaska. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Management Report Supplement Grant W–23–4 and W–23–5. Study 4.0. Juneau. 48pp.

NELSON, R.N. 1993. Unit 22 brown bear survey-inventory progress report. Pages 226–237 in S. Abbott, ed. Management Report of Survey-Inventory Activities. Brown Bear. Alaska Dep. Fish and Game. Fed Aid in Wildl. Rest. Prog. Rep. Proj. W–23–4 and W–23–5. Study 4.0. Juneau. 283pp.

PERSONS K. 1998. Unit 22 moose survey-inventory progress report. Pages 378–397 in M.V. HICKS, ed. Moose. Survey-Inventory Management Report. Alaska Department Fish and Game. Federal Aid Wildlife Restoration. Progress Report. Grant W–24–4 and W–24–5 Study 1.0 Juneau. 485pp.

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Table 1 Unit 22 brown bear harvest[a] for regulatory years 2000–2001 and 2001–2002

Regulatory year	Reported harvest											
	Hunter kill				Non-hunting kill				Total			
	M	F	Unk.	Total	M	F	Unk.	Total	M	F	Unk.	Total
2000–2001												
Fall 2000	14	17	0	31	4	0	3	7	18	17	3	38
Spring 2001	51	12	0	63	1	2	0	3	52	14	0	66
NWABBMA	0	0	0	0	0	0	0	0	0	0	0	0
Total	65	29	0	95	6	1	3	10	71	31	3	104
2001–2002												
Fall 2001	15	21	0	36	0	1	1	2	15	22	1	38
Spring 2002	29	16	0	45	1	0	0	1	30	16	0	46
NWABBMA	0	0	0	0	0	0	0	0	0	0	0	0
Total	44	37	0	81	1	1	1	3	45	38	1	84

[a] Represents the total known harvest including nonresident permit hunt harvest, DLP and other human-caused accidental mortality.

Table 2 Number, residency and success rates of brown bear hunters in Unit 22 for regulatory years 1998–2001

Regulatory Year	Successful hunters						
	Local Residents[a]		Nonlocal Residents		Nonresidents		Total
	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)
1998–1999	30	36%	14	17%	39	47%	83
1999–2000	30	33%	18	20%	43	47%	91
2000–2001	39	41%	10	11%	45	48%	94
2001–2002	34	42%	15	19%	32	40%	81

[a] Hunters residing in Unit 22

Table 3 Sex of Unit 22 brown bear harvest[a] for regulatory years 2000–2001 and 2001–2002

Regulatory Year	Game management unit																	
	22A			22B			22C			22D			22E			Total		
	M	F	U	M	F	U	M	F	U	M	F	U	M	F	U	M	F	U
2000–2001																		
Fall 2000	8	4	0	2	11	0	2	1	1	5	1	2	1	0	0	18	17	3
Spring 2001	13	3	0	17	4	0	10	4	0	7	1	0	5	2	0	52	14	0
2001–2002																		
Fall 2001	3	6	0	6	7	1	2	6	0	4	3	0	0	0	0	15	22	1
Spring 2002	4	2	0	14	6	0	6	3	0	1	3	0	5	2	0	30	16	0

[a] Includes nonresident permit hunts and NWABBMA harvest and non-hunting mortalities.

Table 4 Unit 22 brown bear harvest by transport method for regulatory years 1995–2001

Regulatory Year	Number harvested							
	Airplane	Boat	Snowmachine	ORV	Highway vehicle	Walk	Unknown	Total (*n*)
1995–1996	7	1	29	6	5	0	0	48
1996–1997	9	5	14	15	12	3	0	58
1997–1998	7	6	28	8	10	0	0	59
1998–1999	4	13	42	13	8	3	0	83
1999–2000	7	8	35	25	12	2	0	91
2000–2001	6	10	56	10	10	2	0	94
2001–2002	1	8	42	21	7	2	0	81

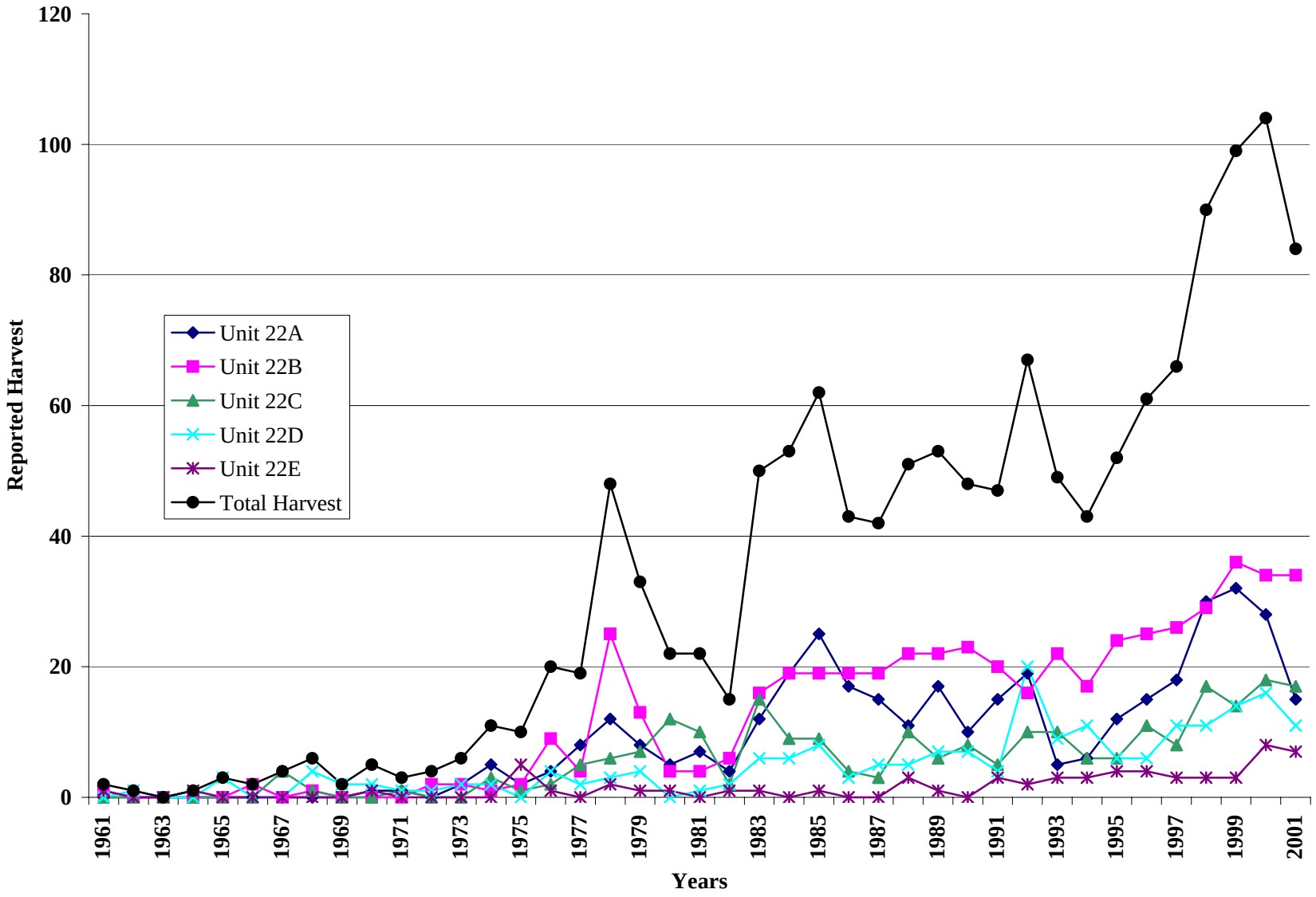

Figure 1 Unit 22 reported brown bear harvest, 1961–2001

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION

907-465-4190 PO BOX 25526
JUNEAU, AK 99802-5526

BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 23 (43,000 mi^2)

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound and western Brooks Range

BACKGROUND

In 1961 ADF&G established hunting regulations and sealing requirements for brown bears in Unit 23. The Board of Game created regulations assuming the primary use of brown bears was for trophy hunting. However, Inupiat hunters in inland communities of Unit 23 have traditionally harvested brown bears for meat, fat and hides (Loon and Georgette 1989). In response to frustration expressed by local residents over hunting regulations for brown bear and other species, ADF&G staff began an extensive regulation review in Unit 23 during 1988. This review provided the basis for establishing the Northwest Alaska Brown Bear Management Area (NWABBMA) subsistence registration hunt in 1992. Since 1992, 3 types of brown bear hunts have existed in Unit 23: 1) 2 drawing permit hunts (DB 781 – fall; DB 791 - spring) for nonresident hunters; 2) a general season hunt for resident hunters; and 3) a subsistence registration permit hunt for resident hunters.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The management goal for brown bears in Unit 23 is to maintain a minimum density of one adult bear per 25.7 mi^2 in the Noatak drainage.

MANAGEMENT OBJECTIVES

- Conduct a census in the Noatak drainage during 2004 or 2005. The census should be comparable to the census completed in 1987.
- Continue community-based assessments to collect brown bear harvest information from residents of Unit 23.

METHODS

We obtained harvest information from sealing documents, community harvest assessments and harvest reports. Compliance with brown bear sealing requirements has historically been low for residents of Unit 23; therefore, this data should be viewed as minimal estimates of harvest. In contrast, most nonlocal hunters seal their bears so this data is reasonably accurate.

We believe community-based harvest assessments and harvest reports from the registration subsistence hunt are much more accurate than sealing data. Computer access to archived harvest data continued to improve during this reporting period. Harvest summaries reported in previous management reports were updated based on these computer files. Many brown bears taken under DLP regulations are not reported, and many of those that have been reported have still not been entered into the statewide harvest files. As a result, harvest data in future reports will likely differ from that reported herein after these discrepancies are corrected. Kotzebue staff telephoned subsistence registration permit holders who failed to respond to the harvest report letter.

The 1987 Red Dog brown bear census provided a benchmark for bear abundance in this portion of Unit 23. Since then, our understanding of the current population status of Unit 23 bears has been based largely on qualitative information from local residents, some long-term commercial operators and my opportunistic observations.

To determine whether harvests have affected the sex and age structure of bear populations I plotted the proportion of males in the total Unit 23 harvest through time. I also plotted the size and age of male bears taken by nonlocal hunters because these hunters select for large males compared to many local hunters who are nonselective or select small bears to eat. I assumed that a decreasing proportion of males in the harvest or a decrease in the size or age of males taken by nonlocal hunters would indicate harvests have affected the sex or age structure of the population. I initially plotted this data for the entire Unit. However, most of the trophy harvest in Unit 23 has historically occurred in the Noatak, Wulik and Kivalina drainages. Therefore, I repeated these plots for this reduced area.

The term ‘nonlocal hunter’ used throughout this report refers to resident Alaskans who live outside Unit 23 as well as nonresident and alien hunters. ‘Local hunter’ refers to anyone who resides in Unit 23.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The only brown bear population census conducted in Unit 23 occurred during 1987 and estimated a density of one adult bear (2.5+ years) per 25.7 mi^2 in the vicinity of the Red Dog Mine (Ballard *et al*. 1991). There is no other quantitative data to indicate population trend.

Residents of Unit 23 indicate brown bear numbers have increased since at least the 1940s or 1950s. Several developments over the last 50 years probably contributed to this trend. Moose, caribou and muskox numbers in this region generally increased since the 1950s to provide a stable prey base for large predators. In addition, the presence of these ungulates substantially reduced the subsistence harvest of brown bears (R. Stoney, pers. commun.). In recent years the decline of the commercial salmon fishery in Kotzebue Sound has allowed more salmon to reach spawning areas far inland, increasing food available to bears. State hunting regulations

have probably contributed to the increase of brown bears in Unit 23 as well. For example, from statehood until the early 1990s brown bear hunting regulations provided primarily for trophy hunting and probably discouraged subsistence hunting to some extent. Additionally, regulations make it virtually impossible to harvest sows. In contrast, 'denning' bears and killing all occupants commonly occurred when bears provided the only reliable source of terrestrial hides, meat and fat to local users (R. Stoney, pers. commun.).

Since the mid 1990s many residents of Unit 23 have complained there are "too many bears" in Unit 23. They have reported that bears damage remote camps, take fish from drying racks and scare people while berry picking or hunting. Similarly, some nonlocal moose and caribou hunters have lost meat to brown bears each year. These reports agree with my opportunistic observations while traveling through the unit via plane, snow machine, boat and foot. Bear predation on moose calves may be a primary factor behind low moose recruitment in large portions of the unit since the mid-to-late 1990s.

Beginning in 2002 I began to receive a few reports from guides and local residents that brown bear numbers may have begun to decline in the Noatak River drainage. My opportunistic observations during 2002 seemed consistent with those reports as I saw fewer bears than in previous years. However, in 2003 many of the same individuals who had reported seeing few bears the previous year reported brown bears were again numerous in the Noatak drainage. Likewise, I saw more bears in that area in 2003 compared to 2002. Brown bear population dynamics cannot explain why so many disparate sources would perceive a 1-year decline in brown bear numbers.

MORTALITY

Harvest

Season and Bag Limit.

The following regulations were in effect throughout the 2000–2001 and 2001–2002 regulatory years:

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 23		
Residents: One bear per regulatory year; a $25.00 tag fee is required	1 Sep–31 May (General hunt)	
Nonresidents: One bear every four regulatory years by drawing permit (24 permits fall; 24 permits spring)		1 Sep–10 Oct 15 Apr–25 May

Residents: One bear per regulatory year by registration permit in the Northwest Alaska Brown Bear Management Area for subsistence purposes	1 Sep–31 May (Subsistence hunt)

Hunters taking a brown bear under the general season hunt were required to use a big game tag and seal the hide and skull. Salvage of meat was optional under this hunt. The NWABBMA subsistence registration permit hunt has been previously described (Dau 2002).

Game Board Actions and Emergency Orders. There were no emergency orders issued for brown bears during the reporting period. In November 2001 the Board of Game increased the nonresident brown bear bag limit to 1 bear per year throughout Unit 23. This change went into effect during the 2002–2003 regulatory year.

Hunter Harvest. The reported harvest of 78 bears (48 males, 26 females and 4 unknown sex) in 2000–2001 was the highest reported since ADF&G began collecting harvest information in 1961–1962 (Fig 1). Although the 2001–2002 harvest of 50 bears (32 males, 17 females and 1 unknown) was substantially lower than this, harvest in this year was still relatively high. As in the past, few bears were taken under the subsistence registration permit hunt (Table 1).

Brown bear harvests have generally increased since the early 1960s despite substantial annual variability around this trend (Fig 1). Annual variation in harvest levels is probably attributable to weather and snow conditions, especially during spring, which strongly affect access and hence success rates. Although establishment of the brown bear subsistence hunt in 1992 may have improved our harvest data to some degree it likely had little influence on the long-term trend toward increasing harvests because so few bears have been taken under this hunt. We feel the subsistence hunt had no effect on actual harvest levels in Unit 23 because brown bears were taken for subsistence prior to 1992 but were usually not reported.

Community harvest estimates suggest villages within Unit 23 take relatively few brown bears for subsistence. For example, only 7 bears were reported taken by the 4 villages surveyed during 1998–1999 (S. Georgette, unpub. data). The unreported harvest associated with DLP kills and illegal take (for selling gall bladders, claws, etc.) is probably greater than the unreported component of legitimate subsistence harvests. For example, several years ago 8 brown bears were taken illegally between Kivalina and Cape Thompson within a period of several days for their gall bladders (C. Bedingfield, pers. commun.). Many residents of Unit 23 feel DLP reporting requirements are onerous and, as a result, many bears taken under these regulations are not reported.

As in previous years, more brown bears were reported taken in the Noatak drainage during this reporting period than in any other drainage (Fig 2, Table 2). This is partly because guides and residents of Kotzebue have historically focused their efforts in the Noatak River drainage where brown bears are abundant and easier to hunt than in the more densely forested Kobuk

and Selawik river drainages. Since 1998 brown bear harvests have increased in the Kobuk drainage and, during 2000–2001, were higher in the Selawik drainage than previously recorded. The high harvest of 2000–2001 resulted from peak harvests simultaneously coming from the Noatak, Kobuk and Selawik drainages.

There was no trend in the proportion of males in the total Unit 23 harvest (Fig 3). Likewise, there was no trend in skull size for male bears taken by nonlocal hunters throughout the Unit (Fig 4). Although there was no clear temporal trend in median age of male bears taken throughout the Unit (Fig 5), it appears hunters began taking somewhat younger bears after 1991.

Historically, most hunting for trophy brown bears in Unit 23 has occurred in that portion of the Noatak drainage below the Anisak River, and in the Wulik and Kivalina drainages. Telemetry results indicate bears commonly move among these drainages (Ballard et al. 1991). If hunting has substantially affected the sex or age structure of bears anywhere in Unit 23, it should be most apparent in harvest by nonlocal hunters (who most strongly select for large males bears) in this area. There was no trend in the proportion of males bears taken, or in the size of male bears harvested in this area for the sample of all bears harvested, or for the subsample of bears harvested only by nonlocal hunters (Fig 6).

Brown bear hunting regulations in Unit 23 have been modified many times since 1962. Since 1992 brown bear regulations been incrementally liberalized to provide for traditional subsistence hunting practices and increase opportunity for recreational hunters. These regulatory changes also attempted to slowly reduce bear density to reduce bear-human conflicts and predation on moose. The long-term increasing trend in reported harvest (Fig 1) is probably more a function of increasing numbers of commercial operators and nonlocal hunters in Unit 23 than the result of more liberal brown bear regulations.

Permit Hunts. Participation in the NWABBMA registration hunt continues to be primarily by residents of the NWABBMA, and especially by residents of Unit 23. As in the past Unit 23 hunters harvested the majority of bears taken in the NWABBMA area. Subsistence hunters took 10 bears (7 males and 3 females) in 2000–2001 and 3 bears (2 males and 1 female) in 2001–2002 (Table 1).

Nonresidents were limited to two drawing permit hunts, DB781 (fall hunt) and DB791 (spring hunt) with 24 permits available in each hunt annually. Nonresidents took 6 bears (2 males and 4 females) in Fall 2000, 11 bears (6 males and 5 females) in Spring 2001, 11 bears (11 males and no females) in Fall 2001, and 12 bears (8 males and 4 females) in Spring 2002 (Table 1). The total nonresident harvest in 2000–2001 (n=18) was less than the harvest in 2001–2002 (n=25)(Table 3).

Hunter Residency and Success. Nonlocal resident and nonresident hunters took 67% and 82% of the total reported Unit 23 harvest during 2000–2001 and 2000–2002, respectively (Table 3). Numbers of Alaskan hunters who reside outside Unit 23 increased substantially since the early 1990s (Fig 7). Numbers of nonresident hunters increased after 1997 when the number of nonresident drawing permits was increased to 24 each for the spring and fall hunts. The

increase in harvest levels is primarily attributable to nonlocal hunters. As with moose hunters, numbers of nonlocal brown bear hunters are increasing in Unit 23 (Fig 8).

Harvest Chronology. Most bears were taken during the months of September, April and May regardless of hunt type (Table 4). During 2000–2001, 49% of the harvest occurred during September and 45% occurred during April–May. In 2001–2002 these percentages were 60% and 38%, respectively.

Transport Methods. Most hunters used aircraft to access hunting areas in the fall and snow machines during spring (Table 5). Many guides are now combining use of airplanes and snow machines to hunt bears. The use of ATVs during fall is increasing in Unit 23 as guides and outfitters base ATVs at remote camps.

Other Mortality

There were no estimates of other mortality for brown bears in Unit 23 during the reporting period.

HABITAT

Assessment

There were no habitat assessment activities in Unit 23 during the reporting period.

Enhancement

There were no habitat enhancement activities in Unit 23 during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

During this reporting period brown bears continued to be viewed as a nuisance or threat to many residents of Unit 23 who encounter them during subsistence activities, e.g. drying fish or picking berries. Many local residents believe brown bears have caused moose numbers to decline in Unit 23 during recent years.

CONCLUSIONS AND RECOMMENDATIONS

- Census a large portion of northwest Unit 23 including the 1987 Red Dog brown bear project study area in 2004 or 2005 to evaluate the effects of development on bear abundance and determine bear density.
- Continue community-based assessments to monitor harvests of brown bears by residents of Unit 23.
- Brown bear regulations in Unit 23 have been incrementally liberalized since the early 1990s. During this time brown bear harvest levels have increased; however, this trend began well before recent regulatory changes. Increases in bear harvests have probably been caused more by increasing numbers of commercial operators and nonlocal hunters throughout Unit 23 than through increased hunting opportunity from liberalized regulations. Although brown bear harvests have clearly increased in Unit 23 over the last 40 years, harvest data do not suggest this has affected the sex or age structure of the

population, or the size of bears available to hunters. Heavily hunted portions of the Unit may be acting as 'population sinks' where bears, especially boars, continually replace those that are harvested through immigration from lightly hunted areas, e.g. the upper Noatak drainage and Brooks Range. Alternatively, harvest data is notoriously insensitive to changes in brown bear population structure. Without census data, human harvests could skew population sex and age structures and not be reflected in harvest data.

LITERATURE CITED

BALLARD, W.B., L.A. AYRES, K.E. RONEY, D.J. REED AND S.G. FANCY. 1991. Demography of Noatak grizzly bears in relation to human exploitation and mining development. Final Report. Alaska Department Fish and Game. Federal Aid in Wildlife Restoration Grant W–23–1, W–23–2, and W–23–3 Study 4.20. Juneau. 227pp.

DAU, J. 2001. Unit 23 Brown bear management report. Pages 264–281 *in* C. Healy, ed. Brown bear management report of survey-inventory activities 1 July 1998–30 June 2000. Alaska Department Fish and Game. Juneau. AK.

LOON, H., AND S. GEORGETTE. 1989. Contemporary brown bear use in NW Alaska. Alaska Department Fish and Game, Division of Subsistence. Tech. Paper No. 163. Kotzebue, AK.

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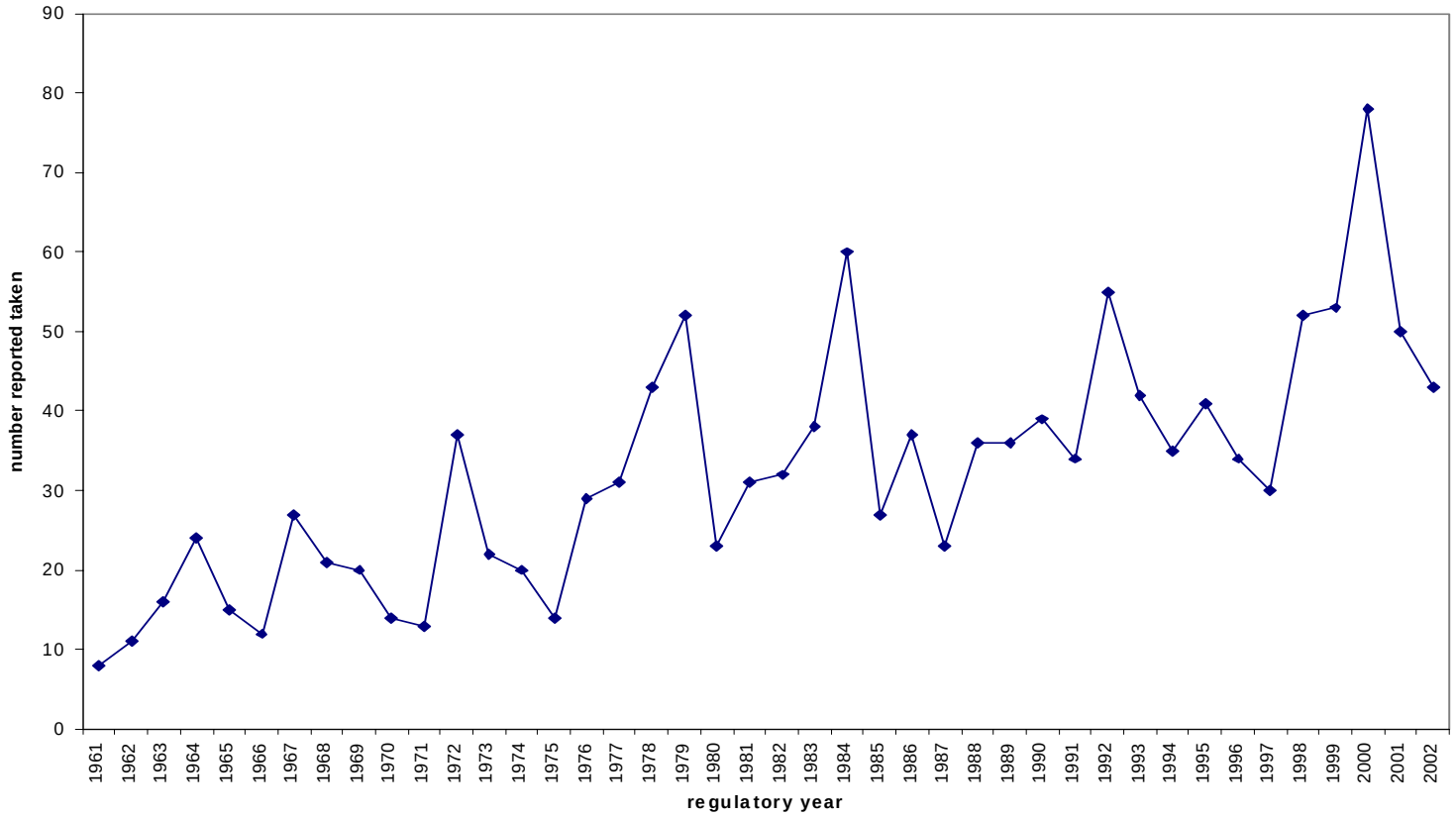

Figure 1 Unit 23 brown bear harvest, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

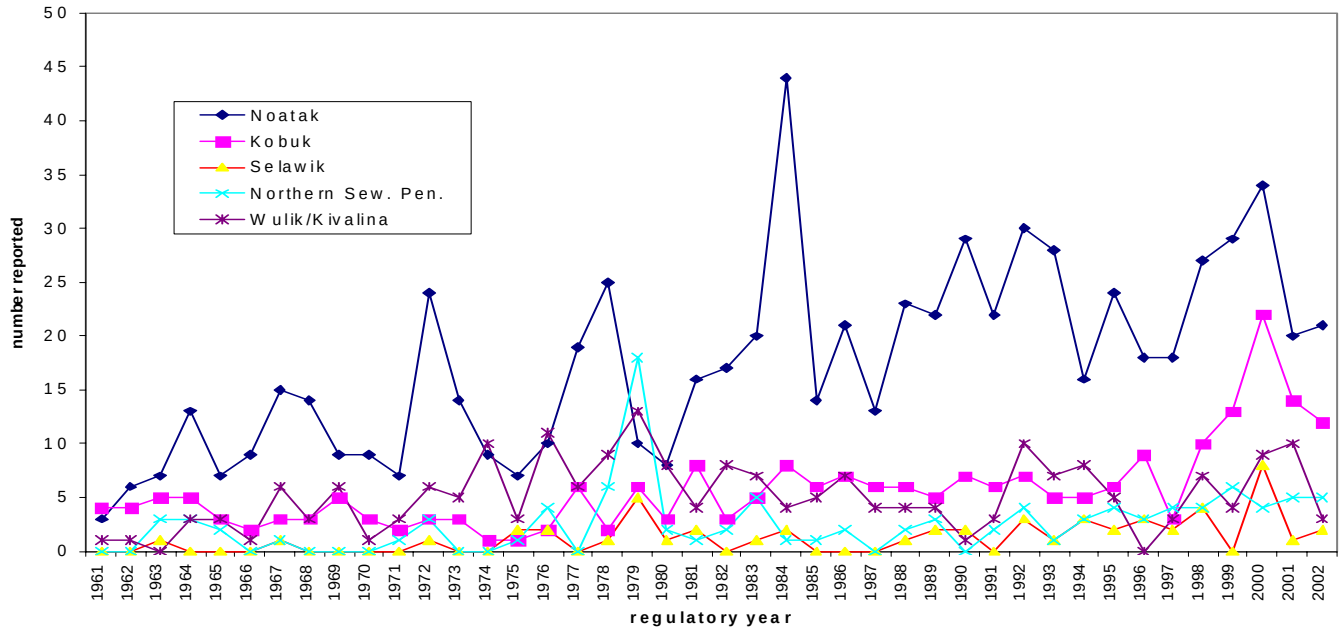

Figure 2 Unit 23 brown bear harvest by drainage, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

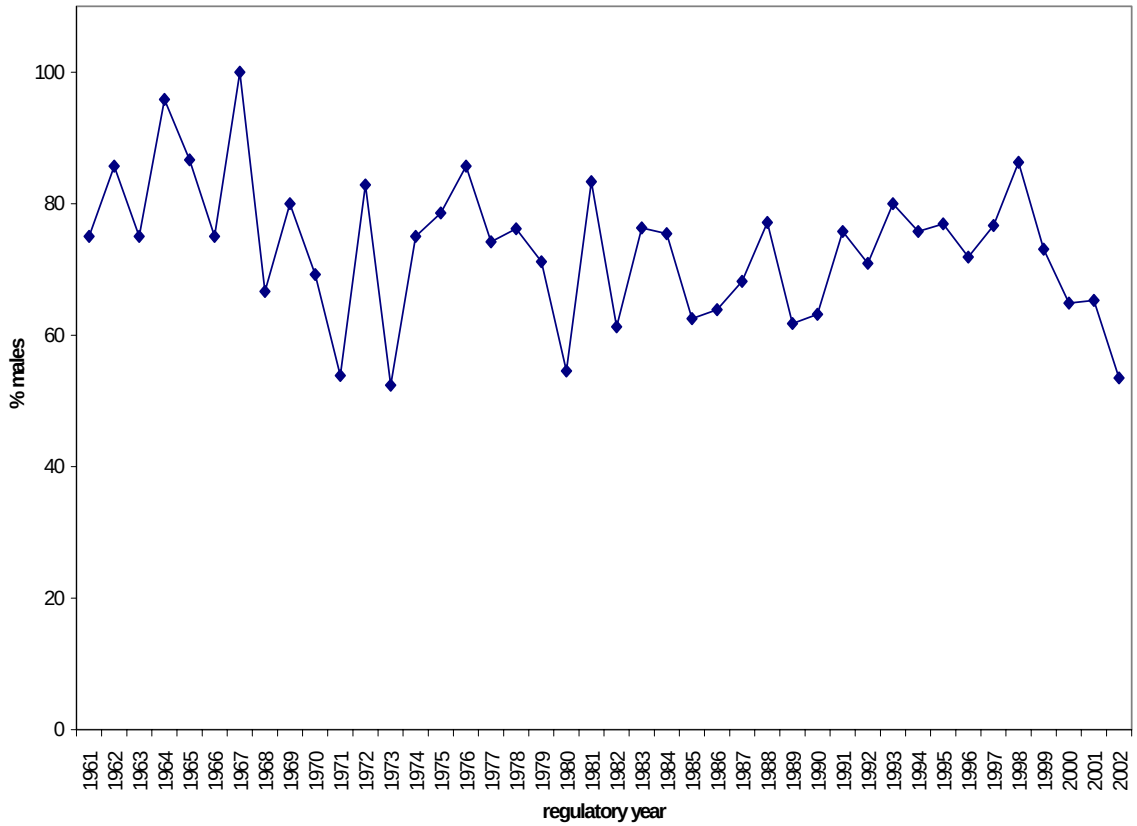

Figure 3 Percentage of males in Unit 23 brown bear harvest, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

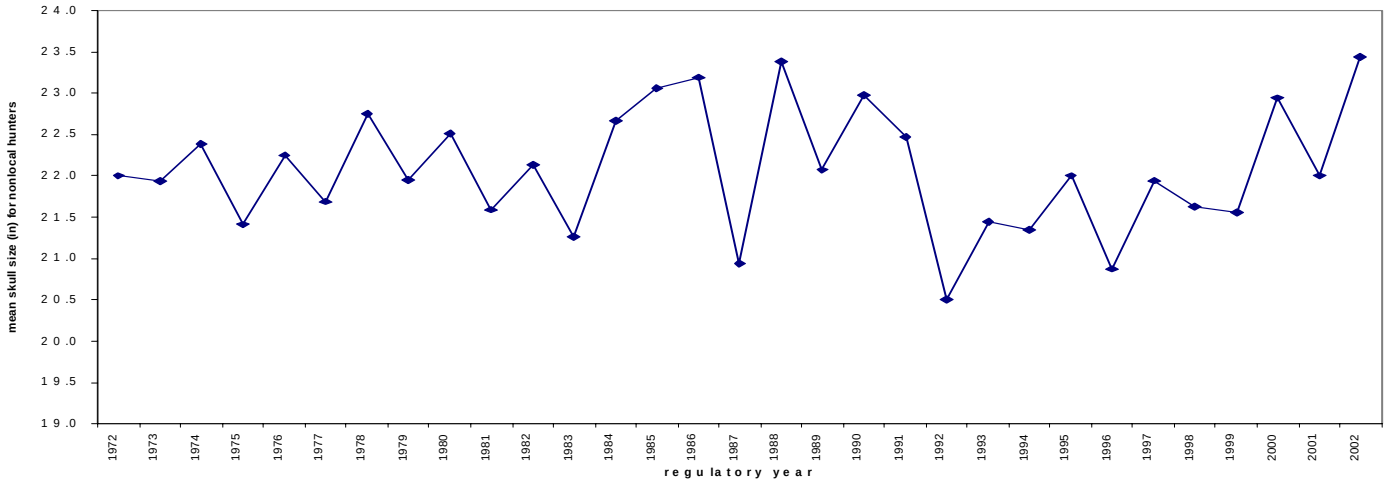

Figure 4 Median skull size of male brown bears taken in Unit 23 by hunters who resided outside the unit, RY 1972–1973 through 2002–2003 (sealing data)

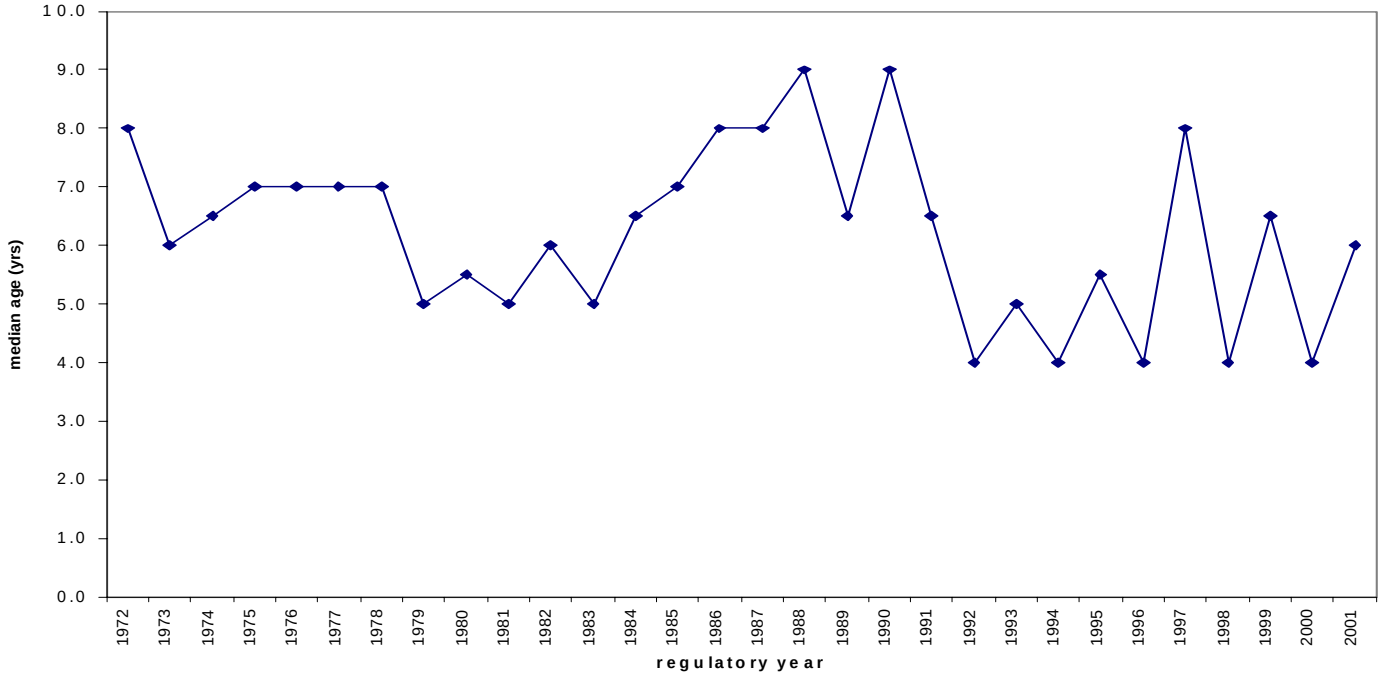

Figure 5 Median age of brown bears harvested in Unit 23, RY 1972–1973 through 2001–2002 (sealing data)

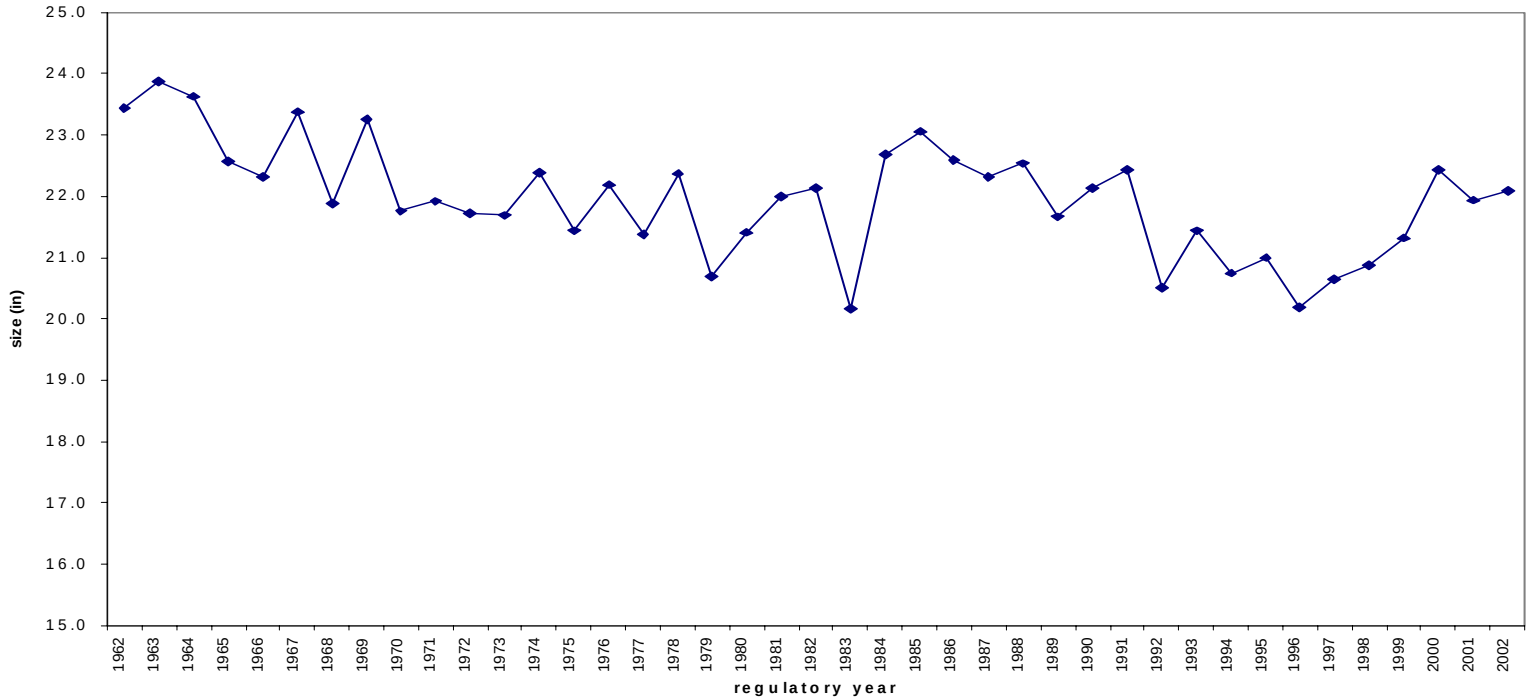

Figure 6 Median skull size of male brown bears taken in that portion of the Noatak drainage below the Anisak R., and in the Wulik and Kivalina drainages, RY 1962–1963 to 2002–2003 (sealing data)

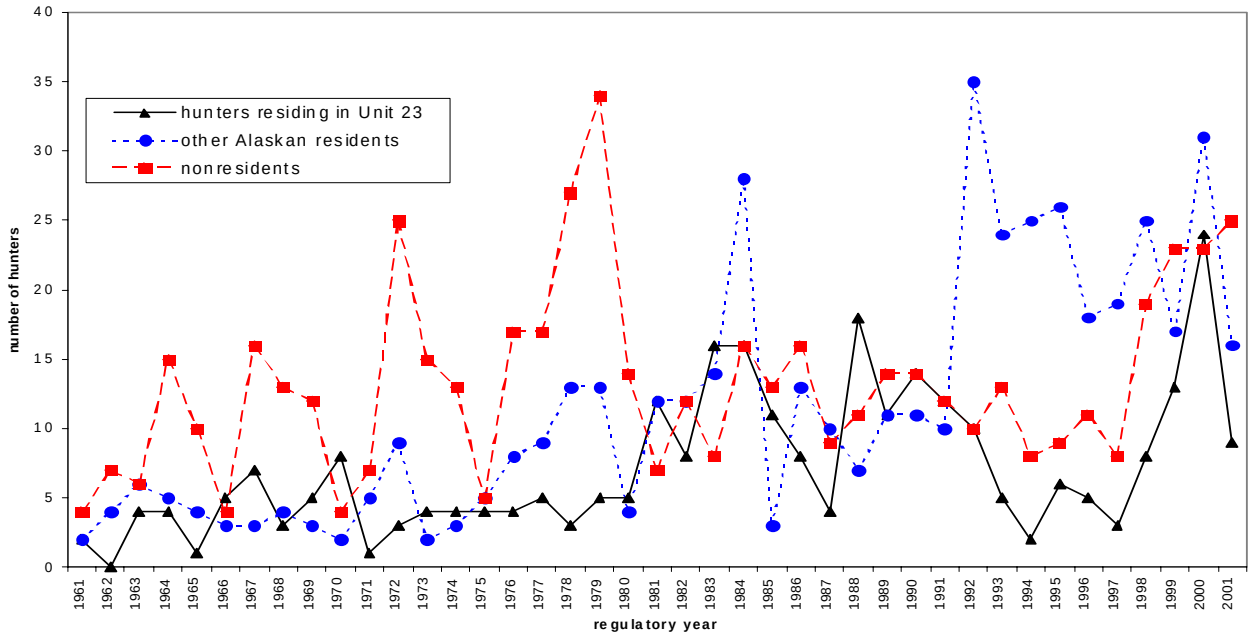

Figure 7 Unit 23 brown bear harvest by hunter residence, RY 1961–1962 to 2001–2002 (sealing and registration permit data)

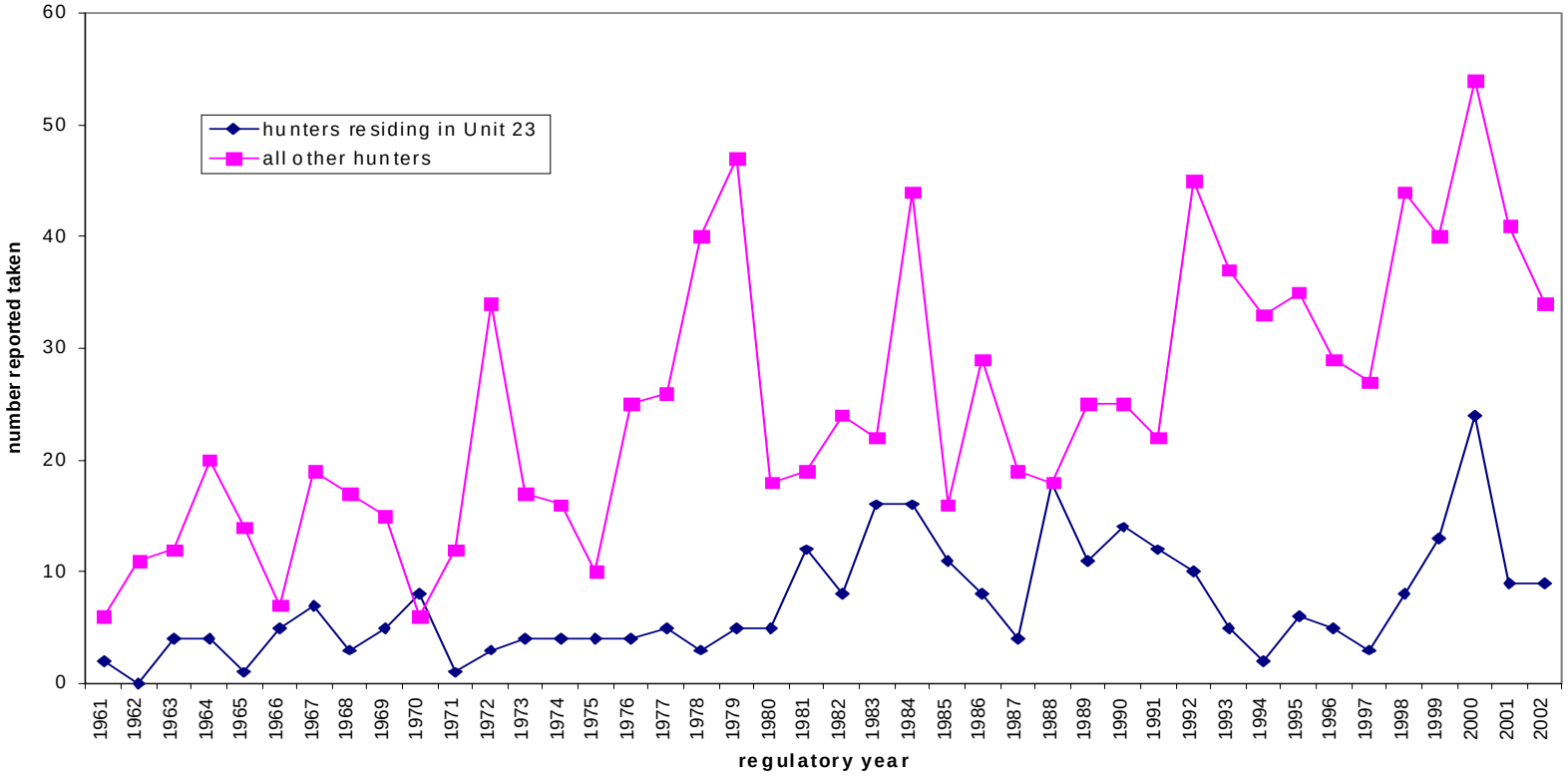

Figure 8 Unit 23 brown bear harvest by hunter residence, RY 1961–1962 to 2002–2003 (sealing and registration permit data)

Table 1 Reported harvest of brown bears in Unit 23, RY 1996–1997 to 2001–2002, by hunt type (excludes bears reported with hunt unknown)

Regulatory year/Hunt type	Male	Female	Unknown	Total
1996–1997				
General hunt	12	7	2	21
Fall nonresident (DB781)	4	1	2	7
Spring nonresident (DB791)	3	0	0	3
NWABBMA (subsistence)	5	1	0	6
Non hunting harvest	3	1	0	4
Total	27	10	4	41
1997–1998				
General hunt	15	5	0	20
Fall nonresident (DB781)	2	2	0	4
Spring nonresident (DB791)	3	0	0	3
NWABBMA (subsistence)	2	0	0	2
Non hunting harvest	2	0	1	3
Total	24	7	1	32
1998–1999				
General hunt	22	4	1	27
Fall nonresident (DB781)	9	2	2	13
Spring nonresident (DB791)	5	0	1	6
NWABBMA (subsistence)	7	0	0	7
Non hunting harvest	1	0	0	1
Total	44	6	4	54
1999–2000				
General hunt	6	6	0	12
Fall nonresident (DB781)	7	4	0	11
Spring nonresident (DB791)	9	1	0	10
NWABBMA (subsistence)	4	1	0	5
Non hunting harvest	6	3	7	16
Total	32	15	7	54
2000–2001				
General hunt	28	16	1	45
Fall nonresident (DB781)	2	4	0	6
Spring nonresident (DB791)	11	0	0	11
NWABBMA (subsistence)	6	3	0	9
Non hunting harvest	0	1	1	2
Total	47	24	2	73
2001–2002				
General hunt	16	7	0	23
Fall nonresident (DB781)	6	5	0	11
Spring nonresident (DB791)	8	4	0	12
NWABBMA (subsistence)	2	1	0	3
Non hunting harvest	0	0	1	1
Total	32	17	1	50

Table 2 Reported Unit 23 brown bear harvest by drainage, RY 1979–1980 to 2001–2002 (excludes bears with unknown harvest location)

Regulatory year	Noatak	Kobuk	Selawik	N. Seward Peninsula	Wulik/ Kivalina	Total
1979–1980	10	6	5	18	6	45
1980–1981	8	3	1	2	7	22
1981–1982	16	8	2	1	3	30
1982–1983	17	3	0	2	7	29
1983–1984	20	5	1	5	6	37
1984–1985	44	8	2	1	3	58
1985–1986	14	6	0	1	3	25
1986–1987	21	7	0	2	6	36
1987–1988	13	6	0	0	3	22
1988–1989	23	6	1	2	2	34
1989–1990	22	5	2	3	4	36
1990–1991	29	7	2	0	1	39
1991–1992	22	6	0	2	2	32
1992–1993	30	7	3	4	9	53
1993–1994	28	5	1	1	6	41
1994–1995	16	5	3	3	5	32
1995–1996	24	6	2	4	5	41
1996–1997	18	9	3	3	0	33
1997–1998	18	3	2	4	3	30
1998–1999	27	10	4	4	7	52
1999–2000	29	13	0	6	3	51
2000–2001	34	22	8	4	7	76
2001–2002	20	14	1	5	7	47

Table 3 Unit 23 brown bear harvest[a] by hunter residency, RY 1985–1986 to 2001–2002

Regulatory year	Unit 23 resident	Nonlocal resident	Nonresident	Unk.	Total
1985–1986	11	3	11	2	27
1986–1987	8	13	16	0	37
1987–1988	4	10	9	0	23
1988–1989	18	7	10	1	36
1989–1990	11	11	14	0	36
1990–1991	14	11	13	1	39
1991–1992	12	10	12	0	34
1992–1993	10	35	10	0	55
1993–1994	5	24	12	1	42
1994–1995	2	25	8	0	35
1995–1996	6	26	9	0	41
1996–1997	5	18	11	0	34
1997–1998	3	19	8	0	30
1998–1999	8	25	19	0	52
1999–2000	13	17	23	0	53
2000–2001	24	31	18	5	78
2001–2002	9	16	25	0	50

[a] Includes nonresident permit hunts and excludes non-hunting moralities.

Table 4 Monthly harvest of brown bears in Unit 23, RY 1988–1989 to 2001–2002 (excludes bears with unknown date of kill)

	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1988–1989	1	1	13	2	0	0	0	0	0	12	7	0	36
1989–1990	0	3	18	3	0	0	0	0	0	7	4	1	36
1990–1991	0	0	21	1	0	0	0	0	0	14	3	0	39
1991–1992	0	0	15	1	0	0	0	0	0	12	6	0	34
1992–1993	0	4	36	3	0	0	0	0	1	11	0	0	55
1993–1994	1	0	21	2	0	0	0	0	0	14	3	0	41
1994–1995	1	0	23	1	0	0	0	0	0	6	4	0	35
1995–1996	0	0	26	2	0	1	0	0	0	8	4	0	41
1996–1997	1	0	22	1	0	0	0	0	0	7	2	1	34
1997–1998	1	0	17	1	0	0	0	0	0	9	2	0	30
1998–1999	0	0	32	1	0	0	0	0	2	5	11	0	51
1999–2000	1	3	25	0	0	0	0	0	0	17	6	1	53
2000–2001	0	2	36	1	0	0	0	0	0	22	11	1	73
2001–2002	0	0	30	0	1	0	0	0	0	9	10	0	50

Table 5 Reported Unit 23 brown bear harvest by transport method, RY 1985–1986 to 2001–2002

Regulatory year	Airplane	Boat	4-wheeler	Snow-machine	Foot	Other	Unknown	Total
1985–1986	15	1	0	8	0	2	0	26
1986–1987	20	7	0	6	1	3	0	37
1987–1988	17	4	1	0	0	0	0	22
1988–1989	13	3	0	11	0	2	0	29
1989–1990	24	4	0	6	0	1	0	35
1990–1991	24	6	0	8	0	1	0	39
1991–1992	20	2	0	11	0	1	0	34
1992–1993	32	3	5	1	2	2	10	54
1993–1994	24	0	1	10	0	2	5	42
1994–1995	17	8	1	7	2	0	1	35
1995–1996	20[a]	5[b]	2	7	1	2	5	41
1996–1997	18	3	0	4	1	3	5	34
1997–1998	15	7	1	4	1	1	2	30
1998–1999	25	10	1	7	3	3	6	52
1999–2000	19	3	0	0	1	0	4	46
2000–2001	41	7	1	20	3	6	0	78
2001–2002	26	10	1	12	0	0	0	49

[a] One hunter indicated he used a boat in conjunction with an airplane, 2 hunters indicated they used 4–wheeler's in conjunction with an airplane.
[b] Three hunters used both a boat and 4–wheeler to harvest brown bears.

Alaska Department of Fish and Game
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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 24 (26,092 mi^2)

GEOGRAPHIC DESCRIPTION: Koyukuk River drainage upstream from the Dulbi River

BACKGROUND

Grizzly bears are found in moderate numbers (25 bears/1000 mi^2) throughout Unit 24, with the highest densities (33 bears/1000 mi^2) in mountainous areas of the Brooks Range in the northern portion of the unit. Specific data on grizzly bear populations in Unit 24 are limited. Information from studies conducted on the northern slopes of the Brooks Range in Unit 26 (Crook 1972; Reynolds 1976; Reynolds and Hechtel 1984) or in the southwestern Brooks Range in Unit 23 (Ballard et al. 1988) has been used to describe bear populations in Unit 24.

Previous reports indicated bear populations were stable or slowly increasing (Woolington 1997). The reported harvest since 1961 rarely exceeded 15–20 grizzly bears/year. Local hunters (residents of Unit 24) took very few bears, and although the opening of the Dalton Highway to the public increased the number of potential nonlocal hunters, an increase in harvest has not occurred. Historically, grizzly bears were an important source of food and hides for local people. However, with the exception of Anaktuvuk Pass residents, recent hunting effort for grizzly bears by unit residents has declined.

MANAGEMENT DIRECTION

MANAGEMENT GOAL

- Protect, maintain, and enhance the grizzly bear population and its habitat in concert with other components of the ecosystem.

MANAGEMENT OBJECTIVE

- Manage a grizzly population that will sustain a 3-year mean annual reported harvest of at least 20 bears in the northern portion of the unit (north of Allakaket) and at least 15 bears in the southern (remaining) portion of the unit, with at least 50% males in the reported harvest.

METHODS

We monitored harvest through sealing requirements and reports returned by hunters reporting under the Northwest Alaska Brown Bear Management Area permit regulations. Sealing was not required in the Northwest Alaska Brown Bear Management Area hunts unless the hide was removed from the unit. Data collected during sealing included sex, location of harvest, skull measurements, and age if teeth were submitted for aging. Data specific to harvest such as transportation methods, time of harvest, and commercial services used were also recorded. Data collected from bears harvested under permit regulations were limited to sex, location, and date of harvest. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY01 = 1 Jul 2001 through 30 Jun 2002). Bear–human conflicts were addressed through education, legal harvest of problem bears, and changes in regulations.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The grizzly bear population in Unit 24 was likely stable or slowly increasing based on field observations, nuisance reports, and hunter sightings of bears during the past 10 years. However, no surveys were conducted in the area during the reporting period.

Reynolds (1989) estimated densities of 33 bears/1000 mi^2 within Gates of the Arctic National Park (7000 mi^2), 33/1000 mi^2 in the Brooks Range outside the park (6500 mi^2), and 22–33 bears/1000 mi^2 in the remainder of Unit 24 to the south (14,500 mi^2). He estimated 450 bears in northern Unit 24 (north of Allakaket) and 320–480 in the remainder of the unit (south of Allakaket). Earlier work in similar habitats in Interior and Arctic Alaska provided a basis for these estimates (Reynolds 1976; Reynolds and Hechtel 1984).

MORTALITY

Harvest

Seasons and Bag Limits.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 24		
One bear every regulatory year by registration permit.	1 Sep–15 Jun (Subsistence hunt only)	No open season
One bear every regulatory year.	1 Sep–15 Jun	1 Sep–15 Jun

Alaska Board of Game Actions and Emergency Orders. In 1990 the Board of Game eliminated all requirements for drawing permits and made a uniform season throughout Unit 24, which was aligned with seasons in Units 19, 20, and 21. In 1992 the board established the Northwest Alaska Brown Bear Management Area that included portions of the unit west of the Dalton Highway Corridor Management Area. The season remained the same, but the bag limit changed to 1 bear/year. Also, all meat had to be salvaged, sealing requirements were waived if the hide and skull remained within the management area, there was no resident tag fee, and aircraft could not be used. During the spring 1996 Board of Game meeting, the portion of Unit 24 within the Dalton Highway Corridor Management Area was included within the Northwest Alaska Brown Bear Management Area. This action allowed Unit 24 residents who resided within the Dalton Highway Corridor Management Area to participate in the subsistence hunt and transport bear hides to their residences without sealing. At the spring 2000 Board of Game meeting, the season was extended to 15 June for both the subsistence and general seasons. The bag limit was also liberalized to allow for the harvest of 1 bear every year under the general harvest regulation. No changes to grizzly bear regulations were adopted during the spring 2002 Board of Game meeting. However, a limited drawing hunt for moose was adopted in 2002 that will likely reduce the number of bears harvested incidental to moose hunting activities.

Hunter Harvest. The average annual grizzly bear harvest by hunters for RY96 through RY01 was 15.3 bears (Table 1). The reported 3-year average harvest (RY99–RY01) for the northern (north of Allakaket) and southern (remaining) portions of the unit was 17.3 and 0.0 bears, respectively. The number of bears taken by fisherman or trappers and not reported is unknown, but was likely <4 bears annually. The 5–year mean annual reported and estimated unreported harvest (RY96–RY01) for the entire unit was 21.0 bears. Of the reported harvest for that same period, 64% were males and 36% were females. Formerly, the estimated sustainable harvest rate was 5–6% based on data from other areas of Interior Alaska (DuBois 1989), but recent data from bear populations in the Interior suggest harvest rates of up to 10-12% are sustainable. A harvest of 51–102 bears can be sustained in this unit. For RY99 through RY01 the average age of harvested bears was 9.0 years of age.

Hunter Residency and Success. Residents of Alaska who did not live in Unit 24 accounted for most of the reported harvest (Table 2). Most of this harvest was incidental to fall moose hunting. Nonresident and local residents took relatively few bears. Typically, harvest was in the range of 10–15 bears annually, but hunters reported harvesting 25 bears in RY00, which was the highest harvest since 1973. Harvest in fall 2001 and 2002 returned to historical levels.

Harvest Chronology and Transport Methods. From RY96 through RY01 most kills occurred during the fall (85%), incidental to hunting other game species. Over the past 4 regulatory years, transportation to the hunt area was primarily via highway vehicle (32.7%), boat (20.0%), horseback (14.5%), or airplane (14.5%).

CONCLUSIONS AND RECOMMENDATIONS

The management objective of maintaining a population that could sustain the stated level of harvest was achieved. During this reporting period (RY00–RY01), harvest throughout the unit was very low and was not a factor influencing the population. Although most of the harvest

took place in the northern portion of the unit, the population was capable of sustaining that level of harvest. The southern portion of the unit was underutilized at an average harvest rate of less than 1 bear per year. The objective of maintaining at least 50% male harvest was achieved, with 64% of the harvest being males. The trend of increasing age of harvested bears suggests that the population has not been heavily harvested. Although Miller (1993) cautioned about using the proportion of males in the harvest to determine the composition of the population, most bears in this unit are harvested in the fall so the bias of a greater number of male bears in the spring harvest was diminished.

Although some localized overhunting could occur in Unit 24, the grizzly bear population as a whole is probably not susceptible to overharvest because hunting is restricted within Gates of the Arctic National Park, where most brown bear habitat occurs. Much of the remainder of the unit is more heavily forested and difficult to hunt. Also, for most hunters the use of firearms is prohibited within 5 miles of the Dalton Highway.

Education, improved reporting compliance, and cooperative activities with federal agencies will continue to be given high priority during the next reporting period. Age and sex ratios of harvested animals are the standard for monitoring large predator populations in the absence of intensive population investigations, and that information will continue to be collected.

LITERATURE CITED

BALLARD W.B., K.E. RONEY, D.N. LARSEN, AND L.A. AYRES. 1988. Demography of Noatak grizzly bears in relation to human exploitation and mining development. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Grants W-22-5 and W-22-6. Study 4.20. Juneau, Alaska, USA.

CROOK J.L. 1972. Grizzly bear survey–inventory activities. Alaska Department of Fish and Game. Mimeo. 38 pp.

DUBOIS S.D. 1989. Unit 20D brown/grizzly bear. Pages 119–127 *in* SO Morgan, editor. Brown bear management report of survey–inventory activities. Part V. Volume XIX. Alaska Department of Fish and Game. Grant W-23-1. Study 4.0. Juneau, Alaska, USA.

MILLER S. 1993. Impacts of increased hunting pressure on the density, structure, and dynamics of brown bear populations in Alaska's Game Management Unit 13. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-22-6, W-23-1, W-23-2, W-23-3, W-23-4, and W-23-5. Study 4.21. Juneau, Alaska, USA.

REYNOLDS H.V. 1976. North Slope grizzly bear studies. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Grants W-17-6 and W-17-7. Study 4.8R, 4.9R, 4.10R, and 4.11R. Juneau, Alaska, USA.

———. 1989. Units 24, 25ABD, and 26ABC brown/grizzly bear. Pages 174–184 *in* SO Morgan, editor. Brown bear management report of survey–inventory activities.

Part V. Volume XIX. Alaska Department of Fish and Game. Grant W-23-1. Study 4.0. Juneau, Alaska, USA.

——— AND J.L. HECHTEL. 1984. Structure, status, reproductive biology, movements, distribution, and habitat utilization of a grizzly bear population. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Research Report. Projects W-21-1, W-21-2, W-22-1, and W-22-2. Job 4.14R. Juneau, Alaska, USA.

WOOLINGTON J. 1997. Unit 24 brown bear. Pages 235–240 *in* MV Hicks, editor. Brown bear management report of survey–inventory activities. Alaska Department of Fish and Game. Grant W-24-3 and W-24-4. Study 4.0. Juneau, Alaska, USA.

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TABLE 1 Unit 24 grizzly bear mortality, regulatory year 1996–1997 through fall 2002

Regulatory year	Reported								Estimated kill		Total estimated kill			
	Hunter kill				Nonhunting kill[a]									
	M	F	Unk	Total	M	F	Unk	Total	Unreported	Illegal	M	F	Unk	Total
1996–1997														
Fall 1996	9	4	0	13	0	0	0	0	3	2	9	4	5	18
Spring 1997	1	1	0	2	0	0	0	0	0	0	1	1	0	2
Total	10	5	0	15	0	0	0	0	3	2	10	5	5	20
1997–1998														
Fall 1997	6	2	0	8	0	1	0	1	3	2	6	3	5	14
Spring 1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6	2	0	8	0	1	0	1	3	2	6	3	5	14
1998–1999														
Fall 1998	8	6	0	14	2	0	0	2	3	2	10	6	5	21
Spring 1999	2	0	0	2	0	0	0	0	0	0	2	0	0	2
Total	10	6	0	16	2	0	0	2	3	2	12	6	5	23
1999–2000														
Fall 1999	6	3	0	9	0	0	0	0	3	2	6	3	5	14
Spring 2000	2	1	0	3	0	0	0	0	0	0	2	1	0	3
Total	8	4	0	12	0	0	0	0	3	2	8	4	5	17
2000–2001														
Fall 2000	14	8	0	22	0	0	0	0	3	2	14	8	5	27
Spring 2001	3	0	0	3	0	0	0	0	0	0	3	0	0	3
Total	17	8	0	25	0	0	0	0	3	2	17	8	5	30
2001–2002														
Fall 2001	5	8	0	13	0	0	0	0	3	2	5	8	5	18
Spring 2002	3	1	0	4	0	0	0	0	0	0	3	1	0	4
Total	8	9	0	17	0	0	0	0	3	2	8	9	5	22
2002–2003														
Fall 2002	6	4	0	10	0	0	0	0	3	2	6	4	5	15

[a] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

TABLE 2 Unit 24 grizzly bear successful hunter residency, regulatory years 1992–1993 through fall 2002

Regulatory Year	Local[a] resident	Nonlocal resident	Nonresident	Total successful hunters
1992–1993	3	9	5	17
1993–1994	1	5	2	8
1994–1995	1	11	4	16
1995–1996	1	7	1	9
1996–1997	2	7	6	15
1997–1998	0	4	4	8
1998–1999	2	10	4	16
1999–2000	0	9	3	12
2000–2001	2	16	7	25
2001–2002	0	11	6	17
Fall 2002	1	4	5	10

[a] Unit residents.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 25A, 25B, 25D, 26B, and 26C (73,755 mi^2)

GEOGRAPHIC DESCRIPTION: Upper Yukon River Drainage and the eastern North Slope of the Brooks Range

BACKGROUND

There was a decline in brown bear numbers during the 1960s primarily due to aircraft-supported hunting associated with guiding. As a result, beginning in spring 1971, Units 25, 26B, and 26C were closed to brown bear hunting. In subsequent years a variety of regulations were used to limit harvest and increase brown bear numbers. Regulations have been gradually liberalized as populations recovered. A harvest objective of no more than 5% of estimated populations has been used in recent years.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Protect, maintain and enhance brown bear populations and habitat in concert with other components of the ecosystem.
- Provide the opportunity to hunt brown bears under aesthetically pleasing conditions in the eastern Brooks Range.
- Provide the greatest sustained opportunity to participate in hunting brown bears in the upper Yukon and Porcupine drainages.

MANAGEMENT OBJECTIVES

- In Unit 25, maintain a brown bear population capable of sustaining mean annual harvests of 30 bears in Unit 25A and 29 bears in Units 25B and 25D, with a minimum of 60% males in the harvest.
- In Units 26B and 26C, maintain a brown bear population capable of sustaining a mean annual hunter harvest of 13 bears in Unit 26B and 19 bears in 26C, with a minimum of 60% males in the harvest.

METHODS

Brown bear population density estimates for Units 25A, 25B, 25D, 26B, and 26C were revised in 1993 based on studies done in portions of these areas (Reynolds 1976; Garner et al. 1984; Reynolds and Hechtel 1984) or in similar habitat elsewhere (Reynolds 1992), taking into consideration observations by area residents and others with long-term experience in the area. Harvest data are obtained from mandatory sealing documents. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Conservative regulations, including a drawing permit system that was in use from 1977 until recently, fostered a recovery in the number of brown bears in Units 25A, 26B, and 26C. During this reporting period (RY00–RY01) bear numbers in Unit 25A were likely stable or increasing and the trend in Units 26B and 26C was likely stable. The long-term population trend in Units 25B and 25D is less well known, but brown bears are common throughout the area and numbers during this period were probably stable or increasing. North Slope residents reported that brown bears were abundant compared to historic levels. Similarly, residents of the Yukon Flats reported that brown bears were scarce during much of this century but were abundant during this reporting period. Numbers have increased in the Yukon Flats area during the last 10–20 years, probably because of a decline in the number of bears harvested by local residents.

Population Size

We estimate there are approximately 1800 brown bears in the eastern Brooks Range and upper Yukon River drainage. We revised population estimates in 1993 and have since used those estimates in our management program (Table 1). The revision was part of a statewide effort to update brown bear population information. We based our estimates on extrapolation from studies in the area or in similar habitat (Reynolds 1976, 1992; Reynolds and Hechtel 1984; Reynolds and Garner 1987), field observations on bear abundance and population trend, and more accurate calculations of land area based on computer digitization of game management units.

Current estimates of bear numbers are somewhat higher than estimates made prior to 1993, largely because increased knowledge of bear densities and, to a lesser extent, because previous calculations of land area were lower than current measurements.

Distribution and Movements

Brown bears are distributed throughout the area. Densities were generally highest in the foothills of the Brooks Range and lowest on the coastal plain of the North Slope. An artificially high concentration of bears developed near Prudhoe Bay (23 in 1500 mi^2; R Shideler, ADF&G, personal communication) because discarded food was available in dumpsters and in the Prudhoe Bay landfill. We observed movement of some brown bears

from the mountains to the Porcupine caribou herd calving area on the coastal plain. Brown bears are also known to concentrate near salmon spawning areas on the lower Sheenjek River in Unit 25A.

MORTALITY

Season and Bag Limit.

Units and Bag Limits	Resident Open Season	Nonresident Open Season
Unit 25A		
RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–20 May	1 Sep–20 May
Units 25B		
RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–31 May	1 Sep–31 May
Unit 25D		
RESIDENT AND NONRESIDENT HUNTERS: One bear every regulatory year.	1 Sep–31 May	1 Sep–31 May
Unit 26B		
RESIDENT HUNTERS: One bear every 4 regulatory years.	1 Sep–31 May	
NONRESIDENT HUNTERS: One bear every 4 regulatory years by drawing permit only; up to 10 permits will be issued.		1 Sep–20 May
Unit 26C		
RESIDENT AND NONRESIDENT HUNTERS: One bear every 4 regulatory years.	20 Aug–31 May	20 Aug–31 May

Alaska Board of Game Actions and Emergency Orders. In March 2002, the Board of Game established a drawing permit hunt for brown bears in the Dalton Highway Corridor Management Area (DHCMA) in Unit 26B. Up to 10 permits may be issued, with 6 being issued in RY02. The regulation was prompted by the increasing number of bow hunters using the DHCMA, and the need to restrict opportunistic brown bear hunting in the open terrain in Unit 26B. The board also established a season closing date of 15 June rather than 20 May for all hunters in Units 25A, 25B, and 26C, and for nonresident hunters in Unit 25D. In addition, the board established a season of 1 March–30 November for resident hunters in Unit 25D. The more liberal season for Unit 25D was proposed in connection with the Yukon Flats Cooperative Moose Management Plan, which resulted in a number of regulation proposals designed to reduce predation on moose. During the previous report period ADF&G issued an emergency order that closed the spring 1998 brown bear season in Unit 26B. This was followed by board actions that reinstated a drawing hunt for nonresidents and changed the

season opening date from 20 August to 1 September in this unit. The board also liberalized brown bear hunting regulations in Unit 25D, eliminating the tag fee for resident hunters and establishing a bag limit of 1 bear per year beginning in RY98. These regulation changes occurred because harvests in the area were extremely low and less restrictive regulations could provide for additional hunting opportunity. The estimated sustainable harvest in Unit 25D was 19 bears, whereas the reported annual harvest was <5 bears.

Drawing permits were required for all brown bear hunters in Units 25A, 26B, and 26C beginning in RY77. As bear populations recovered, regulatory changes included applying the permit requirement only to nonresidents and increasing the number of permits issued in some areas. The requirement for a drawing permit for nonresidents only was applied in Units 25A and 26C beginning in RY84, and in Unit 26B beginning in RY87.

The need for the nonresident permit system in Units 25A, 26B, and 26C was reevaluated in 1993. The improved status of bear populations, a low level of harvest relative to a conservative estimate of sustainable harvest, and the cumbersome nature of the permit system prompted ADF&G to propose eliminating the drawing permit system for nonresident hunters in Units 25A and 26C. The Board of Game adopted this proposal in March 1994, with the understanding that harvests would be closely monitored and that the average annual harvest in each unit during a 2-year period should not exceed the estimated sustainable harvest (Table 1).

Similarly, the permit system for nonresidents in Unit 26B was reevaluated and eliminated by the Board of Game beginning in RY96. The board also established an earlier season opening date of 20 August in Units 26B and 26C. This occurred in response to the closure of the September moose hunting season in most of Unit 26 that took effect in RY96. A decline in brown bear harvest during September was expected to accompany the decline in moose hunting activity during this period. These regulations worked as intended in Units 25A and 26C, but resulted in an unacceptable increase in the harvest in Unit 26B. Following the harvest of 25 bears in Unit 26B during RY96, and 25 during fall 1997, ADF&G closed the remainder of the RY97 season by emergency order. An ADF&G proposal to restore a drawing permit hunt for nonresident hunters and open the season on 1 September rather than 20 August was passed by the board in March 1998. However, in view of the high harvests during the previous 2 years, no permits were issued to nonresidents in RY98, and only 3 bears were reported taken by resident hunters. Up to 3 drawing permits were issued for nonresident hunters in RY99 and RY00, with a 1 September–31 October open season.

Hunter Harvest. The total annual hunter harvest during RY89 through RY01 ranged from 21–35 (Tables 2–5). Most were taken in Units 25A, 26B and 26C. The overall harvest was nearly stable in recent years, except in Unit 26B where the number of bears taken increased during RY96 and RY97. Increased bear numbers and a gradual liberalization of regulations resulted in harvests that were higher than during the late 1970s and early 1980s but were at or below the currently estimated sustainable harvest of 5%.

Despite high harvests in RY96 and RY97, reports from hunters and casual observations indicated that bears were still common in Unit 26B. However, access and hunting pressure adjacent to the Dalton Highway indicate the situation should be closely monitored. The

emergency closure of the spring RY97 season, the reinstatement of the permit requirement for nonresidents in RY98, the decision to not issue permits in RY98, and the change in season opening date reduced harvest significantly. The reported harvest in Unit 25D continued to be low, despite the more liberal regulations established in RY98.

The proportion of males in the overall harvest was 63% in RY00 and 77% in RY01 (Tables 2–5). The number of female bears taken in Units 25, 26B, and 26C during this reporting period was relatively low. Most bears were taken during fall hunts.

Permit Hunts. Drawing permits were required for nonresident hunters in Unit 26B, but not for Alaska residents. A total of 3 permits were issued for nonresident hunters in Unit 26B (outside the DHCMA), and 6 permits were issued for bow hunting in the DHCMA beginning in RY02 (Table 6).

Hunter Residency and Success. During the RY00 and RY01 seasons combined, residents of Alaska accounted for all of the reported harvest in Units 25B and 25D, and 82–93% of the harvest in Unit 26B. During the same period, residents took only 37% of reported harvest in Unit 25A and 32% in Unit 26C (Tables 7–10). Only a few local residents reported taking bears. These figures probably under represent the number taken by local hunters, particularly in Units 25A, 25B and 25D, where a few additional bears are taken but not sealed.

Transport Methods. Most brown bears were harvested during aircraft-supported hunts, with a few taken by hunters using snowmachines and boats. Highway vehicles provided access for some hunters near the Dalton Highway.

Other Mortality

The number of brown bears taken and not reported is unknown, but there were occasional reports of bears being killed but not sealed, especially near villages in Unit 25. Some of this harvest probably occurred in defense of life or property. Local residents of this area do not often specifically hunt bears, but commonly encounter them in the course of other activities. Continued efforts are necessary to encourage local residents to report harvest and seal bears. The relatively large number of bears taken in defense of life or property in Unit 26B in RY01 reflects ADF&G actions to remove food-conditioned bears in the Prudhoe Bay oilfield area.

Relatively little is known about natural mortality of brown bears in northeastern Alaska. Reynolds and Hechtel (1984) observed natural mortality rates in the western Brooks Range of 47% for cubs, 12% for yearlings, and 13% for 2-year-olds.

CONCLUSIONS AND RECOMMENDATIONS

Management objectives were met, and harvests in Units 25A, 25B, 25D, and 26C were at or below levels specified in management objectives. Existing management objectives are generally suitable for the next period, but harvest objectives for Unit 25D should be revised in view of recent developments relating to moose management.

Management goals and objectives for ungulate populations should be considered in setting grizzly bear management goals for this area. Moose populations are currently limited by

predation and grizzly bears are an important predator on newborn moose calves (Gasaway et al. 1992; Bertram and Vivion 2002). The Board of Game has determined that the moose population in Unit 25D is important for providing high levels of human consumptive use under the State's intensive management law. The board must consider intensive management if regulatory action to significantly reduce moose harvest becomes necessary because of a decline in numbers or productivity. In addition, one of the goals of the Yukon Flats Cooperative Moose Management Plan is to increase moose numbers. The plan identified the need to reduce predation by grizzly bears, black bears and wolves. The following revised grizzly bear management goal and objective will be adopted for Unit 25D during the next reporting period.

MANAGEMENT GOAL

- Provide maximum opportunity to participate in hunting grizzly bears in Unit 25D.

MANAGEMENT OBJECTIVE

- Manage for a temporary reduction in grizzly bear numbers and predation on moose in Unit 25D. After moose populations increase to desired levels, reduce bear harvests to allow the bear population to recover.

LITERATURE CITED

BERTRAM M. AND M. VIVION. 2002. Moose mortality in eastern interior Alaska. *Journal of Wildlife Management* 66(3):747–756.

GARNER G.W., H.V. REYNOLDS, L.D. MARTIN, T.J. WILMERS, AND T.J. DOYLE. 1984. Ecology of brown bears inhabiting the coastal plain and adjacent foothills and mountains of the northeastern portion of the Arctic National Wildlife Refuge. Pages 330–358 *in* GW Garner and PE Reynolds, editors. Arctic National Wildlife Refuge coastal plain resource assessment–1983 update report; baseline study of the fish, wildlife, and their habitats. US Fish and Wildlife Service, Fairbanks, Alaska,USA.

GASAWAY W.C., R.D. BOERTJE, D.V. GRANGAARD, D.G. KELLEYHOUSE, R.O. STEPHENSON, AND DG LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120.

REYNOLDS H.V. 1976. North Slope grizzly bear studies. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Report. Jobs 4.8R, 4.9R, 4.10R, and 4.11R. Grants W-17-6 and W-17-7. Juneau, Alaska, USA.

———. 1992. Grizzly bear population ecology in the western Brooks Range, Alaska. Alaska Department of Fish and Game. Progress Report to National Park Service, Alaska Regional Office. Fairbanks, Alaska, USA.

——— AND G.W. GARNER. 1987. Patterns of grizzly bear predation on caribou in northern Alaska. International conference on bear research and management 7:59–68.

——— AND J.L. HECHTEL. 1984. Structure, status, reproductive biology, movement, distribution, and habitat utilization of a grizzly bear population. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Study 4.14R. Grants W-21-1, W-21-2, W-22-1, and W-22-2. Juneau, Alaska, USA.

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TABLE 1 Units 25A, 25B, 25D, 26B, and 26C brown bear population parameters and estimated sustainable harvest, 1993–2002

Unit	Area (mi^2)	Estimated density/100 mi^2	Estimated population size	Allowable harvest @ 5%
25A	21,280	2.8	596	30
25B and D	26,660	2.2	587	29
25 subtotal	47,940		1183	59
26B	15,500	1.7	263	13
26C	10,272	3.8	390	20
26 subtotal	25,772		653	32
Total	73,712	2.5	1843	92

TABLE 2 Unit 25A brown bear mortality[a,b], regulatory years 1989–1990 through 2001–2002

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1989–1990														
Fall 1989	6	6	(50)	0	12	1	1	1	7	(50)	7	(50)	1	15
Spring 1990	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	6	6	(50)	0	12	1	1	1	7	(50)	7	(50)	1	15
1990–1991														
Fall 1990	6	3	(33)	0	9	0	0	0	6	(67)	3	(33)	0	9
Spring 1991	3	2	(40)	0	5	0	0	0	3	(60)	2	(40)	0	5
Total	9	5	(36)	0	14	0	0	0	9	(64)	5	(36)	0	14
1991–1992														
Fall 1991	7	3	(30)	2	12	0	0	0	7	(70)	3	(30)	2	12
Spring 1992	3	0	(0)	0	3	0	0	0	3	(100)	0	(0)	0	3
Total	10	3	(30)	2	15	0	0	0	10	(77)	3	(23)	2	15
1992–1993														
Fall 1992	11	5	(31)	0	16	1	0	0	12	(71)	5	(29)	0	17
Spring 1993	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	5	(31)	0	16	1	0	0	12	(71)	5	(29)	0	17
1993–1994														
Fall 1993	5	3	(38)	0	8	0	0	0	5	(62)	3	(38)	0	8
Spring 1994	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)	0	8	0	0	0	5	(62)	3	(38)	0	8
1994–1995														
Fall 1994	9	3	(25)		12	0	0	0	9	(75)	3	(25)	0	12
Spring 1995	0	1	(100)		1	0	0	0	0	(0)	1	(100)	0	1
Total	9	4	(31)	0	13	0	0	0	9	(69)	4	(31)	0	13

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
Fall 1995	10	4	(29)	0	14	0	0	0	10	(71)	4	(29)	0	14
Spring 1996	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	10	4	(29)	0	14	0	0	0	10	(71)	4	(29)	0	14
1996–1997														
Fall 1996	11	9	(45)	0	20	0	0	0	11	(55)	9	(45)	0	20
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	9	(45)	0	20	0	0	0	11	(55)	9	(45)	0	20
1997–1998														
Fall 1997	6	5	(45)	0	11	1	0	0	7	(58)	5	(42)	0	12
Spring 1998	0	2	(100)	0	2	0	0	0	0	(0)	2	(100)	0	2
Total	6	7	(54)	0	13	1	0	0	7	(50)	7	(50)	0	14
1998–1999														
Fall 1998	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13
Spring 1999	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	8	4	(33)	1	13	0	0	0	8	(67)	4	(33)	1	13
1999–2000														
Fall 1999	11	3	(21)	0	14	0	0	0	11	(79)	3	(21)	0	14
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	11	3	(21)	0	14	0	0	0	11	(79)	3	(21)	0	14
2000–2001														
Fall 2000	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
Spring 2001	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	9	2	(18)	0	11	1	1	0	10	(77)	3	(23)	0	13
Spring 2002	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	10	2	(17)	0	12	1	1	0	11	(79)	3	(21)	0	14

[a] Includes harvest by permit.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

TABLE 3 Unit 25B and 25D brown bear mortality[a,b], regulatory years 1989–1990 through 2001–2002

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1989–1990														
Fall 1989	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Spring 1990	3	0	(0)	0	3	0	0	0	3	(100)	0	(0)	0	3
Total	4	1	(20)	0	5	0	0	0	4	(80)	1	(20)	0	5
1990–1991														
Fall 1990	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
Spring 1991	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	2	3	(60)	0	5	0	0	0	2	(40)	3	(60)	0	5
1991–1992														
Fall 1991	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1992	0	1	(100)	0	1	0	0	0	0	(0)	1	(100)	0	1
Total	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
1992–1993														
Fall 1992	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1993	2	1	(33)	0	3	0	0	0	2	(66)	1	(33)	0	3
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
1993–1994														
Fall 1993	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Spring 1994	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
1994–1995														
Fall 1994	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Spring 1995	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
Fall 1995	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 1996	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
1996–1997														
Fall 1996	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
1997–1998														
Fall 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Spring 1998	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
1998–1999														
Fall 1998	0	0	(0)	1	1	0	0	0	0	(0)	0	(0)	1	1
Spring 1999	1	0	(0)	0	0	0	0	0	1	(100)	0	(0)	0	1
Total	1	0	(0)	1	2	0	0	0	1	(100)	0	(0)	1	2
1999–2000														
Fall 1999	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 2000	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	4	2	(33)	0	6	0	0	0	4	(67)	2	(33)	0	6
2000–2001														
Fall 2000	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2001	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Spring 2002	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1

[a] Includes harvest by permit.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

TABLE 4 Unit 26B brown bear mortality[a,b], regulatory years 1989–1990 through 2001–2002

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1989–1990														
Fall 1989	6	5	(45)	0	11	1	0	0	7	(58)	5	(42)	0	12
Spring 1990	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Total	9	6	(40)	0	15	1	0	0	10	(63)	6	(37)	0	16
1990–1991														
Fall 1990	3	5	(62)	0	8	0	0	0	3	(38)	5	(62)	0	8
Spring 1991	4	0	(0)	0	4	0	0	0	4	(100)	0	(0)	0	4
Total	7	5	(42)	0	12	0	0	0	7	(58)	5	(42)	0	12
1991–1992														
Fall 1991	8	5	(38)	0	13	0	0	0	8	(62)	5	(38)	0	13
Spring 1992	4	0	(0)	0	4	0	0	0	4	(100)	0	(0)	0	4
Total	12	5	(29)	0	17	0	0	0	12	(71)	5	(29)	0	17
1992–1993														
Fall 1992	7	4	(36)	0	11	0	1	0	7	(58)	5	(42)	0	12
Spring 1993	1	1	(50)	1	3	0	0	0	1	(50)	1	(50)	1	3
Total	8	5	(38)	1	14	0	1	0	8	(57)	6	(40)	1	15
1993–1994														
Fall 1993	4	5	(56)	1	10	0	1	0	4	(40)	6	(60)	1	11
Spring 1994	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	5	6	(55)	1	12	0	1	0	5	(42)	7	(58)	1	13
1994–1995														
Fall 1994	6	4	(40)	0	10	0	0	0	6	(60)	4	(40)	0	10
Spring 1995	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	8	4	(33)	0	12	0	0	0	8	(66)	4	(33)	0	12

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
Fall 1995	7	2	(22)	0	9	0	0	0	7	(78)	2	(22)	0	9
Spring 1996	0	2	(100)	0	2	0	0	0	0	(0)	2	(100)	0	2
Total	7	4	(36)	0	11	0	0	0	7	(64)	4	(36)	0	11
1996–1997														
Fall 1996	15	7	(32)	0	22	1	0	0	16	(70)	7	(30)	0	23
Spring 1997	1	2	(66)	0	3	0	0	0	1	(33)	2	(66)	0	3
Total	16	9	(36)	0	25	1	0	0	17	(65)	9	(35)	0	26
1997–1998														
Fall 1997	17	8	(32)	0	25	0	1	0	17	(65)	9	(35)	0	26
Spring 1998	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	17	8	(32)	0	25	0	1	0	17	(65)	9	(35)	0	26
1998–1999														
Fall 1998	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
Spring 1999	0	0	(0)	0	0	0	1	0	0	(0)	1	(100)	0	1
Total	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
1999–2000														
Fall 1999	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4
2000–2001														
Fall 2000	6	4	(40)	0	10	0	0	0	6	(60)	4	(40)	0	10
Spring 2001	1	0	(0)		0	0	0	0	1	(100)	0	(0)	0	1
Total	7	4	(36)	0	11	0	0	0	7	(64)	4	(36)	1	11

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	10	3	(23)	0	13	2	3	1	12	(67)	6	(33)	1	19
Spring 2002	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	11	3	(21)	0	14	2	3	1	13	(68)	6	(32)	1	20

[a] Includes harvest by permit.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

TABLE 5 Unit 26C brown bear mortality[a,b], regulatory years 1989–1990 through 2001–2002

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1989–1990														
Fall 1989	1	1	(50)	0	2	1	0	0	2	(67)	1	(33)	0	3
Spring 1990	0	0	(0)	0	0	0	1	0	0	(0)	1	(100)	0	1
Total	1	1	(50)	0	2	1	1	0	2	(50)	2	(50)	0	4
1990–1991														
Fall 1990	3	1	(25)	0	4	0	0	0	3	(75)	1	(25)	0	4
Spring 1991	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	5	1	(17)	0	6	0	0	0	5	(83)	1	(17)	0	6
1991–1992														
Fall 1991	4	2	(33)	0	6	2	0	2	6	(75)	2	(25)	2	10
Spring 1992	1	1	(50)	0	2	0	0	0	1	(50)	1	(50)	0	2
Total	5	3	(38)	0	8	2	0	2	7	(70)	3	(30)	2	12
1992–1993														
Fall 1992	0	5	(100)	0	5	0	0	0	0	(0)	5	(100)	0	5
Spring 1993	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	1	5	(83)	0	6	0	0	0	1	(17)	5	(83)	0	6
1993–1994														
Fall 1993	6	0	(0)	0	6	0	0	0	6	(100)	0	(0)	0	6
Spring 1994	0	1	(100)	0	1	0	0	0	0	(0)	1	(100)	0	1
Total	6	1	(14)	0	7	0	0	0	6	(86)	1	(14)	0	7
1994–1995														
Fall 1994	1	2	(67)	0	3	0	0	0	1	(33)	2	(67)	0	3
Spring 1995	1	0	(0)	0	1	0	0	0	1	(100)	0	(0)	0	1
Total	2	2	(50)	0	4	0	0	0	2	(50)	2	(50)	0	4

Regulatory year	Reported								Total estimated kill				
	Hunter kill					Nonhunting kill[c]							
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
1995–1996														
Fall 1995	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
Spring 1996	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	4	3	(43)	0	7	0	0	0	4	(57)	3	(43)	0	7
1996–1997														
Fall 1996	5	3	(38)	0	8	0	0	0	5	(63)	3	(38)	0	8
Spring 1997	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)	0	8	0	0	0	5	(63)	3	(38)	0	8
1997–1998														
Fall 1997	4	2	(33)	0	6	0	0	0	4	(66)	2	(33)	0	6
Spring 1998	2	0	(0)	0	2	0	0	0	2	(100)	0	(0)	0	2
Total	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8
1998–1999														
Fall 1998	2	1	(33)	0	3	0	0	0	2	(67)	1	(33)	0	3
Spring 1999	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	2	1	(33)	0	3	0	0	0	2	(67)	1	(33)	0	3
1999–2000														
Fall 1999	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8
Spring 2000	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	6	2	(25)	0	8	0	0	0	6	(75)	2	(25)	0	8
2000–2001														
Fall 2000	8	5	(38)	0	13	1	0	1	9	(64)	5	(36)	1	15
Spring 2001	0	0	(0)		0	0	0	0	0	(0)	0	(0)	0	0
Total	8	5	(38)	0	13	1	0	1	9	(64)	5	(36)	1	15

Regulatory year	Reported								Total estimated kill					
	Hunter kill					Nonhunting kill[c]								
	M	F	(%)	Unk	Total	M	F	Unk	M	(%)	F	(%)	Unk	Total
2001–2002														
Fall 2001	5	3	(38)		8	1	0		6	(67)	3	(33)		9
Spring 2002	0	0	(0)	0	0	0	0	0	0	(0)	0	(0)	0	0
Total	5	3	(38)		8	1	0	0	6	(67)	3	(33)	0	9

[a] Includes harvest by permit.

[b] No estimate was made of unreported or illegal kills.

[c] Includes defense of life or property kills, research mortalities, and other known human-caused accidental mortality.

TABLE 6 Unit 26B brown bear harvest data by permit hunt, regulatory years 1987–1988 through 2001–2002

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunt	Percent successful hunters	Males	Females	Unk	Total harvest
Fall hunts									
(DB288)	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1988–1989	n/a	n/a	25	75	1	2	0	3
	1989–1990	n/a	n/a	n/a	n/a	n/a	n/a	4	4
	1990–1991	6	33	0	67	1	2	1	4
	1991–1992	6	33	0	67	4	0	0	4
	1992–1993	6	50	0	50	1	3	0	4
(DB987)	1993–1994	6	50	17	33	0	2	0	2
	1994–1995	6	50	0	50	3	0	0	3
	1995–1996	6	0	17	83	4	1	0	5
	1996–1997[a]								
	1997–1998[a]								
	1998–1999	0	0	0	0	0	0	0	0
	1999–2000	3	100	0	0	0	0	0	0
	2000-2001	2	0	0	100	2	0	0	2
	2001-2002	1	0	0	100	0	1	0	1
Spring hunts									
(DB297)	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1988–1989	n/a	n/a	n/a	n/a	3	0	0	3
	1989–1990	n/a	n/a	n/a	n/a	0	0	3	3
	1990–1991	4	0	0	100	4	0	0	4
	1991–1992	4	25	0	75	3	0	0	3
	1992–1993	2	0	50	50	0	0	1	1
(DB997)	1993–1994	0	0	0	0	0	0	0	0
	1994–1995	0	0	0	0	0	0	0	0
	1995–1996	0	0	0	0	0	0	0	0
	1996–1997[a]								
	1997–1998[a]								
	1998–1999	0	0	0	0	0	0	0	0

Hunt/Area	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunt	Percent successful hunters	Males	Females	Unk	Total harvest
	1999–2000	0	0	0	0	0	0	0	0
	2000-2001	0	0	0	0	0	0	0	0
	2001-2002	1	100	0	0	0	0	0	0
Totals for	1987–1988	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
all permit	1988–1989	n/a	n/a	n/a	n/a	4	2	0	6
hunts	1989–1990	n/a	n/a	n/a	n/a	n/a	n/a	7	7
	1990–1991	10	20	0	80	5	2	1	8
	1991–1992	10	30	0	70	7	0	0	7
	1992–1993	8	38	12	50	1	3	1	5
	1993–1994	6	50	17	33	0	2	0	2
	1994–1995	6	50	0	50	3	0	0	3
	1995–1996	6	0	17	83	4	1	0	5
	1996–1997[a]								
	1997–1998[a]								
	1998–1999[a]	0	0	0	0	0	0	0	0
	1999–2000	3	100	0	0	0	0	0	0
	2000–2001	2	0	0	100	2	0	0	2
	2001–2002[b]	2	50	0	50	0	1	0	1

[a] The nonresident drawing hunt in Unit 26B was eliminated in regulatory year 1996–1997 and reinstated in regulatory year 1998–1999.
[b] Preliminary data.

TABLE 7 Unit 25A residency of successful brown bear hunters[a], regulatory years 1985–1986 through 2001–2002

Regulatory year	Local[b] resident		Nonlocal resident (%)		Nonresident (%)		Total successful hunters
	(%)						
1985–1986	1	(11)	2	(22)	6	(67)	9
1986–1987	0	(0)	6	(50)	6	(50)	12
1987–1988	0	(0)	3	(23)	10	(77)	13
1988–1989	1	(5)	8	(38)	12	(57)	21
1989–1990	1	(8)	2	(17)	9	(75)	12
1990–1991	2	(14)	6	(43)	6	(43)	14
1991–1992	1	(7)	4	(27)	10	(67)	15
1992–1993	0	(0)	6	(38)	10	(62)	16
1993–1994	0	(0)	4	(50)	4	(50)	8
1994–1995	0	(0)	8	(62)	5	(38)	13
1995–1996	0	(0)	4	(29)	10	(71)	14
1996–1997	0	(0)	2	(10)	18	(90)	20
1997–1998	0	(0)	3	(23)	10	(77)	13
1998–1999	1	(7)	3	(23)	9	(69)	13
1999–2000	0	(0)	4	(29)	10	(71)	14
2000–2001	0	(0)	1	(14)	6	(86)	7
2001–2002	0	(0)	6	(50)	6	(50)	12

[a] Includes harvest by permit.

[b] Includes only residents of the subunit.

TABLE 8 Unit 25B and 25D residency of successful brown bear hunters[a], regulatory years 1985–1986 through 2001–2002

Regulatory year	Local[b] resident		Nonlocal resident (%)		Nonresident (%)		Total successful hunters
	(%)						
1985–1986	0	(0)	0	(0)	2	(100)	2
1986–1987	0	(0)	1	(25)	3	(75)	4
1987–1988	0	(0)	2	(40)	3	(60)	5
1988–1989	1	(25)	0	(0)	3	(75)	4
1989–1990	1	(20)	1	(20)	3	(60)	5
1990–1991	1	(20)	3	(60)	1	(20)	5
1991–1992	0	(0)	0	(0)	2	(100)	2
1992–1993	1	(25)	0	(0)	3	(75)	4
1993–1994	0	(0)	2	(100)	0	(0)	2
1994–1995	2	(50)	2	(50)	0	(0)	4
1995–1996	0	(0)	1	(50)	1	(50)	2
1996–1997	1	(33)	0	(0)	2	(67)	3
1997–1998	0	(0)	0	(0)	0	(0)	0
1998–1999	1	(50)	0	(0)	1	(50)	2
1999–2000	4	(80)	0	(0)	1	(20)	5
2000–2001	1	(100)	0	(0)	0	(0)	1
2001–2002	0	(0)	1	(100)	0	(0)	1

[a] Includes harvest by permit.

[b] Includes only residents of the subunit.

TABLE 9 Unit 26B residency of successful brown bear hunters[a], regulatory years 1985–1986 through 2001–2002

Regulatory year	Local[b] resident (%)	Nonlocal resident (%)	Nonresident (%)	Total successful hunters
1985–1986	0 (0)	0 (0)	6 (100)	6
1986–1987	0 (0)	2 (40)	3 (60)	5
1987–1988	0 (0)	6 (46)	7 (54)	13
1988–1989	0 (0)	4 (44)	5 (56)	9
1989–1990	0 (0)	7 (47)	8 (53)	15
1990–1991	0 (0)	4 (33)	8 (66)	12
1991–1992	0 (0)	10 (59)	7 (41)	17
1992–1993	0 (0)	9 (69)	4 (30)	13
1993–1994	0 (0)	10 (83)	2 (17)	12
1994–1995	0 (0)	9 (75)	3 (25)	12
1995–1996	0 (0)	6 (55)	5 (45)	11
1996–1997	1 (4)	11 (44)	13 (57)	25
1997–1998	0 (0)	9 (35)	16 (64)	25
1998–1999	0 (0)	3 (100)	0 (0)	3
1999–2000	0 (0)	4 (100)	0 (0)	4
2000–2001	0 (0)	9 (82)	2 (18)	11
2001–2002	0 (0)	13 (93)	1 (7)	14

[a] Includes harvest by permit.

[b] Includes only residents of the subunit.

TABLE 10 Unit 26C residency of successful brown bear hunters[a], regulatory years 1985–1986 through 2001–2002

Regulatory year	Local[b] resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters
1985–1986	0	(0)	4	(67)	2	(33)	6
1986–1987	0	(0)	6	(67)	3	(33)	9
1987–1988	0	(0)	5	(63)	3	(37)	8
1988–1989	0	(0)	3	(50)	3	(50)	6
1989–1990	0	(0)	0	(0)	2	(100)	2
1990–1991	0	(0)	3	(50)	3	(50)	6
1991–1992	0	(0)	4	(50)	4	(50)	8
1992–1993	1	(17)	1	(17)	4	(66)	6
1993–1994	1	(14)	6	(86)	0	(0)	7
1994–1995	0	(0)	2	(50)	2	(50)	4
1995–1996	0	(0)	0	(0)	7	(100)	7
1996–1997	0	(0)	4	(50)	4	(50)	8
1997–1998	2	(25)	0	(0)	6	(75)	8
1998–1999	0	(0)	0	(0)	3	(100)	3
1999–2000	0	(0)	1	(12)	7	(88)	8
2000–2001	0	(0)	5	(38)	8	(62)	13
2001–2002	0	(0)	2	(25)	6	(75)	8

[a] Includes harvest by permit.

[b] Includes only residents of the subunit.

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BROWN BEAR MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 26A (56,000 mi^2)

GEOGRAPHIC DESCRIPTION: Western North Slope

BACKGROUND

Densities of brown/grizzly bears vary widely in Unit 26A, with densities highest in the foothills of the Brooks Range and lowest in the northern portion of the unit. Bear populations were reduced during the 1960s by hunting, but are currently stable or slowly increasing. Hunters, particularly those from out of state, have continued to show an interest in hunting bears in Unit 26A. Subsistence hunting regulations for the Northwest Alaska Brown Bear Management Area (NWABBMA) allow residents to hunt brown bears primarily for food in Units 21D, 22 except 22C, 23 except Baldwin Peninsula, 24, and 26A.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain the existing brown bear population.

MANAGEMENT OBJECTIVES

- Maintain a grizzly bear population of approximately 800 bears or greater.
- Maintain a harvest success rate of at least 60%.
- Minimize adverse interactions between grizzly bears and the public.

METHODS

There was a radiotelemetry study in the southern portion of Unit 26A for a number of years, with methods previously reported in research progress reports (Reynolds 1984, 1989) and management reports (Trent 1985, 1989; Carroll 1993).

Population densities for broad habitat zones in Unit 26A were estimated using subjective comparisons to areas of the North Slope with known bear densities. The habitat zones include the coastal plain (<800 ft elevation), the foothills (800–2500 ft elevation), and mountains (>2500

ft elevation). Bear densities within these habitat zones are available from studies in the western Brooks Range (1992), the Arctic National Wildlife Refuge (1982–1990), the Canning River and Ivashak River drainages (1973–1975), and the Prudhoe Bay oilfield area (1990–1993).

We used brown bear sealing certificates to determine seasonal harvests. For sealed bears we summarized the date and location of taking, skull sizes, and sex/age composition of harvested animals. Hunting activity was summarized by residency of hunters and their methods of transportation. For reporting population estimates and harvest summaries, we divided Unit 26A at 159º W longitude into Unit 26A East and Unit 26A West.

The sealing certificate system has not proven to be an effective method to determine local harvest, so we reviewed several community-based harvest assessment studies to get an insight into local harvest. Some of the communities have been studied more than once so we were able to calculate mean harvests for these villages. In 1992 nearly all the villages were studied so we determined the total harvest for that year. For the villages of Anaktuvuk Pass and Nuiqsut, which are on the border of Unit 26A, we assumed that half of their bear harvest came from Unit 26A.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The most recent bear density information comes from June 1992 for the Utukok and Kokolik drainages in Unit 26A West. The density was calculated at 29.5 bears/1000 km^2 with a 95% confidence interval of 28.1–31.5 bears/1000 km^2 (Reynolds, personal communication).

The current population estimate for bears in Unit 26A is 900–1120 bears (Reynolds 1989). We estimate there are 400 bears in Unit 26A West and 500–720 bears in Unit 26A East (Table 1). This represents a substantial increase from the pre–1987 population estimate of 645–780 bears.

Bear populations in the Brooks Range apparently declined during the 1960s due to guided hunting (Reynolds, personal communication) and have been recovering since permit hunts were instituted during the 1977–78 regulatory year (Trent 1989). Bear densities appear to be at high levels relative to carrying capacity of the habitat.

Population Composition

The most recent population composition and productivity data are available from Reynolds (1984) for the western portion of the unit in the Utukok and Kokolik drainages. The sex ratio for bears older than 1 year was approximately 40 males/60 females; for cubs and yearlings it was approximately 50:50, but may have slightly favored females.

Age composition was as follows: cubs of the year - 13%; yearlings - 10%; 2-year-olds - 14%; 3 and 4-year-olds - 11%; and bears over 5 years - 52%. Mean age at first reproduction was 8.0 years, mean litter size was 2.0 cubs, mean reproductive interval was 4.0 years, and mean productivity was 0.5 cubs/year.

Distribution and Movements

We estimate densities for habitat zones in Unit 26A at 0.5–2 bears/1000 km^2 on the coastal plain, 10–30 bears/1000 km^2 in the foothills, and 10–20 bears/1000 km^2 in the mountains. These densities yield an estimated total of 1007 bears, with 81 in the coastal plain, 666 in the foothills, and 260 in the mountains.

MORTALITY

Harvest

Season and Bag Limit.

Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 26A Resident and Nonresident Hunters: 1 bear every regulatory year.	20 Aug–31 May (General hunt only)	20 Aug–31 May (General hunt only)
Unit 26A Resident Hunters: 1 bear per regulatory year by registration permit in the Northwest Alaska Brown Bear Management Area for subsistence purposes.	20 Aug–31 May (Subsistence hunt only)	
Nonresident Hunters		No open season

Board of Game Actions and Emergency Orders. During their spring 1996 meeting, the Board eliminated the drawing permit requirements for nonresident brown bear hunters in Unit 26A and lengthened the season to 20 August–31 May. The change was made to simplify the complex permit system. The harvest in Unit 26A had been well below the maximum sustained yield and the permit hunt was undersubscribed. Our goal will be to keep the harvest at or below an average of 5% of the bear population during any 2-year period. Therefore, the maximum allowable harvest will be 31 bears per year in Unit 26A East and 20 bears in Unit 26A West. If this quota is exceeded during one year then the quota for the next year will be reduced by as much as it was exceeded during the first year. If the average is exceeded, more restrictive regulatory action, including emergency orders, will be considered. The system depends upon open lines of communication between ADF&G, guides, and hunters.

During their fall 1999 meeting, the board increased the bag limit from 1 bear every 4 years to 1 bear every year. This was done to provide more opportunity for hunters because the bear harvest

had remained well below the maximum sustained yield level. The 1 bear per regulatory year restriction does count against the 1 bear every 4 regulatory years restriction in other units.

Human-Induced Harvest. Eighteen bears were sealed during 2000–2001. No bears were reported killed in defense of life and property (DLP). Six bears were killed in Unit 26A West and 12 in Unit 26A East (Table 1). Fourteen bears were males and 4 were females (Table 2).

Thirteen bears were sealed during 2001–2002. No bears were killed in Unit 26A West and 13 in Unit 26A East (Table 1). Ten bears were males and 3 were females (Table 2). There were no DLPs reported. Preliminary results indicate that 12 bears have been reported harvested during the 2002–2003 season.

The sealing certificate system has not proven to be an effective method to determine actual local harvest, so we reviewed several community-based harvest assessment studies to get an indication of local harvest. We determined that the total of the mean number of bears harvested per year was approximately 11–12 bears (Braund et al. 1991, 1993; Brower and Opie 1996, 1997; Fuller and George 1997; Hepa et al. 1997; Pedersen 1989, 1995, 2001). These numbers are reflected in Unreported Kill in Table 2. Fuller and George (1997) obtained information from nearly every village in 1992, which indicated that local residents harvested at least 9–10 bears that year. Sealing certificates indicated a reported local harvest of 3 bears in 1992.

The reported harvest in 2000–2001 (18 bears) and 2001–2002 (13 bears) was higher than 1998–1999 (10 bears) and 1999–2000 (11 bears), but was below the average number harvested in past years (27.3). The harvests reported in 1990–1991 (32 bears) and 1991–1992 (34 bears), remain the highest reported harvests for Unit 26A (Table 2).

For bears harvested during 2000–2001, the mean skull size for males was 21.9 inches and 20.8 inches for females; the mean age was 11.0 years for males and 9.0 years for females. During 2001–2002 the mean skull size for males was 21.0 inches and 18.7 inches for females; the mean age was 9.4 years for males and 5.3 years for females (Table 3).

Permit Hunts. There were no permit hunts for brown bears in Unit 26A. Permit hunts were discontinued by Board action as of the 1996-1997 regulatory year.

Hunter Residency and Success. Of the 18 bears sealed in Unit 26A during 2000–2001, 12 were harvested by nonresidents, 3 by a nonlocal Alaska resident, and 3 by a North Slope resident. During 2001–2002, 9 of 13 bears were harvested by nonresidents, 4 by nonlocal Alaska residents, and 0 by North Slope residents (Table 4).

Harvest Chronology. During 2000-2001, 10 bears were harvested during August, 6 in September, and 2 in May. During 2001-2002, 7 bears were harvested in August and 6 in September. (Table 5).

Transport Methods. Most bear hunters continued to use aircraft as transportation in Unit 26A. During 2000–2001, 15 hunters used aircraft for transportation, 1 used a boat, 1used a snogo, and 1 walked. All 13 hunters used aircraft during 2001-2002 (Table 6).

Other Mortality

No recent estimate of natural mortality for grizzly bears in Unit 26A is available. However, Reynolds and Hechtel (1983) reported mortality rates among offspring accompanied by marked adult females in the western Brooks Range to be 44% for cubs, 9% for yearlings, and 14 % for 2-year-olds from 1977–81.

HABITAT

Assessment

Most of the brown bear habitat in Unit 26A remains undisturbed and supports a fairly large and growing population of bears. It would be difficult to evaluate many of the food sources for brown bears in Unit 26A, such as herbivorous forage and ground squirrels. Caribou represent a large food resource available to bears for at least part of the year. The decline in the Colville River moose population in the early 1990s and the current recovery may have affected bear numbers.

Potential hazards to brown bear habitat include oil, gas, and mineral exploration and development. Exploration is currently underway in Unit 26A, including areas within the foothills on the north side of the Brooks Range.

Some areas in Unit 26A, particularly some east/west-oriented ridges, are used much more heavily than the surrounding area by brown bears for at least part of the year (Reynolds, personal communication). An attempt should be made to catalogue as many of these areas as possible. These areas should be considered critical habitat for brown bears and given special protection in the future.

Enhancement

There were no habitat enhancement activities in Unit 26A during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

There were no activities related to nonregulatory management problems/needs in Unit 26A during the reporting period.

CONCLUSIONS AND RECOMMENDATIONS

Hunters reported 18 bears harvested during 2000–2001 and 13 bears during 2001–2002. This was an increase over the past 2 years, but below the average number of bears harvested between 1990 and 1998 (27.3) and well below the allowable sustained yield of approximately 51 bears. Even if unreported harvest is as high as 100% of the reported harvest, the total estimated yearly harvest of 26–36 bears would still be well within safe harvest limits.

Oil, gas, and mineral exploration and development are potential hazards to brown bear habitat. Reynolds has stated that some areas, particularly some east/west-oriented ridges, have very high brown bear densities. We should identify these critical habitat areas and catalogue them so they can be given special protection during upcoming mineral exploration and development projects.

A significant management problem in Unit 26A continues to be unreported harvest and non-compliance with bear hunting regulations. To accommodate rural hunting practices, the Board of Game established the Northwest Alaska Brown Bear Management Area (NWABBMA) with alternate hunting regulations for subsistence users in 1992. The regulations are designed for people who hunt bears for food. The regulations eliminate tags and sealing procedures and allow harvest reports by mail. Hopefully, these regulations will improve harvest reporting and compliance.

One problem not addressed by the current regulatory system or the special management area regulations is that accurate harvest information still depends upon hunters buying licenses and reporting their harvest. Many local hunters do not buy hunting licenses or report their harvest. To help alleviate this problem, ADF&G personnel worked with the North Slope Borough to develop a harvest documentation system that is more acceptable to local residents. Harvest monitors have been hired in some villages and are collecting harvest information for several species.

In order to approximate local harvest, we used data from the North Slope Borough and other community-based harvest assessment studies. We determined that the total of the mean number of bears harvested in Unit 26A villages per year was approximately 11–12 bears. Fuller and George obtained information from most villages in 1992 which indicated that local residents harvested approximately 9–10 bears in Unit 26A that year. Sealing certificates indicated a reported local harvest of 3 bears in 1992. While not all harvested bears are reported, the local unreported harvest does not appear to be at a level that creates a biological problem.

In 1996 the Board of Game discontinued the brown bear drawing permit system and lengthened the season in Unit 26A. In addition, the Board increased the bag limit from 1 bear every 4 years to 1 bear every year in 1999. It has been surprising that, since 1996, the bear harvest has been less than before the regulations were liberalized. This might be explained by a lack of a concurrent moose season and hunters that would have secondarily harvested bear while hunting moose. Eliminating the drawing permit system has reduced paper work and time spent administering the hunt and has not led to overharvest. We will continue communicating with the guides and urge them to limit their harvests and to be selective toward males. In order to have consistent regulations with other parts of the state, we recommend a change in bag limit so that the one bear per year regulation does not count against one bear per every 4 year restriction in other areas.

LITERATURE CITED

BRAUND, S.R. & ASSOCIATES, AND INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH. 1991. North Slope Subsistence Study - Barrow, 1987, 1988, and 1989. Technical Report No. 149. Prepared for the U.S. Department of Interior, Minerals Management Service.

———. 1993. North Slope Subsistence Study - Wainwright, 1988 and 1989. Technical Report No. 147. Prepared for the U.S. Department of Interior, Minerals Management Service.

BROWER, H.K. AND R.T. OPIE. 1996. North Slope Borough Subsistence Documentation Project: Data for Anaktuvuk Pass, Alaska for the Period July 1, 1994 to June 30, 1995. North Slope Borough Department of Wildlife Management Report. 36 pp. Available from

North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.

———, AND ———. 1997. North Slope Borough Subsistence Documentation Project: Data for Nuiqsut, Alaska for the Period July 1, 1994–June 30, 1995. North Slope Borough Department of Wildlife Management Report. 44 pp. Available from North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.

CARROLL, G.M. 1993. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 271–283 *in* SM. Abbot, ed. Management report of survey-inventory activities, 1 July 1990–30 June 1992. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–23–1 and W–23–5, Study 4.0. Juneau. 283pp.

FULLER, A.S. AND J.C. GEORGE. 1997. Evaluation of Subsistence Harvest Data from the North Slope Borough 1993 Census for Eight North Slope Villages: for the Calendar Year 1992. North Slope Borough Department of Wildlife Management Report. 76 pp. Available from North Slope Borough Department of Wildlife Management, Box 69, Barrow, Alaska 99723 USA.

HEPA, R.T., H.K. BROWER AND D. BATES. 1997. North Slope Borough Subsistence Harvest Documentation Project: Data for Atqasuk, Alaska for the Period July 1, 1994 to June 30, 1995. Department of Wildlife Management, North Slope Borough, Barrow, Alaska. 40 pages.

PEDERSEN, S. 1989. Pt. Lay Subsistence Land and Resource Use. In Impact Assessment, Inc: Pt. Lay Case Study. Technical Report No.139. U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Anchorage, Alaska.

———. 1995. Nuiqsut. Chapter XXII, Vol.5. In J. Fall and C. Utermohle, eds. An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska. Technical Report No.160. U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Anchorage, Alaska.

———. 2001. Subsistence Harvest Levels and Spatial Dimensions of Caribou, Moose, Brown bear and Muskox Hunting in Nuiqsut during Regulatory Year 2000. Draft Report: Division of Subsistence, Arctic Region, Alaska Department of Fish and Game, Fairbanks, Alaska.

REYNOLDS, H.V. 1984. Unit 24–26 brown/grizzly bear survey-inventory progress report. Pages 94–96 in JA Barnett, ed. Annual report of survey-inventory activities. Part I. Brown/grizzly Bears. Vol. XIV. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–22–1 and W–22–2. Job 17.0 and 4.0. Juneau. 96pp.

———. 1989. Unit 24–26 brown/grizzly bear survey-inventory progress report. Pages 174–184. SO Morgan, ed. Annual report of survey-inventory activities, 1987. Vol. XIX, Part V. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–23–1, Study 4.0. Juneau. 189pp.

_____, AND J.L. HECHTEL. 1983. Reproductive biology, movement, distribution, and habitat utilization of a grizzly bear population. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report. Grant W–22–1. Job 4.14R. Juneau. 22pp.

TRENT, J.N. 1985. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 65–69 in B Townsend, ed. Annual report of survey-inventory activities. Part V. Brown Bears. Vol. XVI. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report Grant W–22–4. Job 4.0. Juneau. 69pp.

———. 1989. Unit 26A brown/grizzly bear survey-inventory progress report. Pages 174–184. SO Morgan, ed. Annual report of survey-inventory activities, 1987. Vol. XIX, Part V. Alaska Department Fish and Game Federal Aid in Wildlife Restoration Progress Report. Grant W–23–1, Study 4.0. Juneau. 189pp.

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Table 1 Estimated Population Size and Reported harvest of brown/grizzly bears in Unit 26A, 1988–2002

Unit	Estimated population size	5% harvest rate	Reported harvest											
			1988–1989	1989–1990	1990–1991	1991–1992	1992–1993	1993–1994	1994–1995	1995–1996	1996–1997	1997–1998	1998–1999	1999–2000
26A West	400	20	25	12[a]	16	13[a]	16	9[a]	7	6	8	6	4[a]	7
26A East	500–720	25–36	6	14	16[a]	21	13	17	13	17	12	14	6	4
Total	900–1200	45–56	31	26[a]	32[a]	34[a]	29	26[a]	20	23	20	20	10[a]	11

[a] Includes DLP Bears

Unit	Estimated population size	5% harvest rate	Reported Harvest	
			2000–2001	2001–2002
26A West	400	20	6	0
26A East	500–720	25–36	12	13
Total	900–1200	45–56	18	13

[a] Includes DLP Bears

Table 2 Unit 26A brown bear harvest[a], 1985–2002

Regulatory	Hunter harvest						Non-hunting		Un-reported	Total
Year	M	(%)	F	(%)	Unk.	Total	kill	Total	est. kill	est. kill
1985–1986										
Fall 1985	3	(43)	4	(57)		7				
Spring 1986	2	(40)	3	(60)		5				
Total	5	(42)	7	(58)		12	2	14	5–7	19–21
1986–1987										
Fall 1986	10	(77)	3	(23)		13				
Spring 1987	6	(86)	1	(14)		7				
Total	16	(80)	4	(20)		20		20	8–11	28–31
1987–1988										
Fall 1987	11	(58)	8	(42)		19				
Spring 1988	2	(67)	1	(33)		3				
Total	13	(59)	9	(41)		22		22	8–12	30–34
1988–1989										
Fall 1988	12	(71)	5	(29)		17				
Spring 1989	11	(79)	3	(21)		14				
Total	23	(74)	8	(26)		31		31	12–17	43–48
1989–1990										
Fall 1989	10	(53)	9	(47)		19				
Spring 1990	7	(100)	0			7				
Total	17	(63)	9	(33)	1	27		27	8–13	34–39
1990–1991										
Fall 1990	15	(75)	5	(25)		20				
Spring 1991	8	(73)	3	(27)		11				
Total	23	(74)	8	(26)		31	1	32	5–12	37–44
1991–1992										
Fall 1991	22	(81)	5	(19)		27				
Spring 1992	6	(100)	0			6				
Total	28	(82)	5	(15)	1	34	0	34	5–10	39–44
1992–1993										
Fall 1992	18	(95)	1	(5)		19				
Spring 1993	8	(80)	2	(20)		10				
Total	26	(90)	3	(10)		29	0	29	6–12	35–41

Regulatory	Hunter harvest						Non-hunting		Un-reported	Total
Year	M	(%)	F	(%)	Unk.	Total	kill	Total	est. kill	est. kill
1993–1994										
Fall 1993	11	(79)	3	(21)		14				
Spring 1994	8	(89)	1	(11)		9				
Total	19	(83)	4	(17)		23	3	26	6–12	32–38
1994–1995										
Fall 1994	9	(75)	3	(25)		12				
Spring 1995	7	(88)	1	(12)		8				
Total	16	(80)	4	(20)		20	0	20	6–12	26–32
1995–1996										
Fall 1995	7	(53)	6	(47)		13				
Spring 1996	6	(60)	3	(30)	1(10)	10				
Total	13	(57)	9	(39)	1(10)	23	2	23	6–12	29–35
1996–1997										
Fall 1996	11	(69)	5	(31)		16	0			
Spring 1997	2	(67)	1	(34)		3	0	3	1	
Total	13	(68)	6	(32)		19	1	20	6–12	06–32
1997–1998										
Fall 1997	11	(69)	5	(31)		16	0			
Spring 1998	2	(50)	2	(50)		4				
Total	13	(65)	7	(35)		20	0	20	6–12	26–32
1998–1999										
Fall 1998	6	(60)	4	(40)		10	0			
Spring 1999	0		0			0	0			
Total	5	(56)	4	(44)		9	1	10	6–12	16–22
1999–2000										
Fall	7	(64)	4	(36)		11				
Spring	0		0			0				
Total	7	(64)	4	(36)		11	0	11	6–12	17–23
2000–2001										
Fall	12	(75)	4	(25)		16				
Spring	2		0			2				
Total	14	(78)	4	(22)		18	0	18	6-12	24-30

Regulatory	Hunter harvest						Non-hunting		Un-reported	Total
Year	M	(%)	F	(%)	Unk.	Total	kill	Total	est. kill	est. kill
2001–2002										
Fall	10	(77)	3	(23)		13				
Spring	0		0							
Total	10		3				0	13	6-12	19-25

[a] Permit hunt harvest included.

[b] Includes DLP kills, research mortalities, and other known human caused accidental mortality.

Table 3 Unit 26A brown bear skull size and age, 1985–2002

	Mean skull size, inches				Mean age, years			
Regulatory year	Male	*N*	Female	*n*	Male	*n*	Female	*n*
1985–1986	20.6	5	20.2	5	8.8	5	10.3	5
1986–1987	20.9	10	19.2	5	8.2	12	4.6	5
1987–1988	22.5	16	20.0	9	11.1	16	11.9	9
1988–1989	22.0	14	19.9	6	11.2	13	9.2	6
1989–1990	21.5	17	19.7	8	9.8	16	11.7	9
1990–1991	21.1	22	19.5	8	10.1	22	7.8	8
1991–1992	20.0	28	19.9	5	7.9	25	16.6	4
1992–1993	21.2	17	19.0	1	8.3	17	3.0	1
1993–1994	20.9	11	19.0	3	8.0	10	4.3	3
1994–1995	21.4	16	18.8	4	7.7	14	3.5	4
1995–1996	21.2	13	19.1	7	8.1	12	6.1	4
1996–1997	20.9	12	19.5	6	7.8	12	6.0	6
1997–1998	21.4	10	19.3	6	8.5	11	7.6	5
1998–1999	22.1	5	19.4	4	6.0	3	7.3	4
1999–2000	21.7	7	18.4	4	10.0	6	5.5	4
2000–2001	21.9	14	20.8	4	11.0	14	9.0	4
2001–2002	21.0	10	18.7	3	9.4	10	5.3	3

Table 4 Unit 26A brown bear successful hunter[a] residency, 1985–2002

Regulatory year	Local resident	Nonlocal resident	Nonresident	Unknown	Total hunters
1985–1986	2	7	2	1	12
1986–1987	0	8	12		20
1987–1988	1	8	13		22
1988–1989	1	10	20		31
1989–1990	2	12	13		27
1990–1991	1	9	21		31
1991–1992	2	15	16		33
1992–1993	1	8	20		29
1993–1994	1	10	12		23
1994–1995	0	5	15		20
1995–1996	6	4	13		23
1996–1997	2	0	18	0	20
1997–1998	1	1	18	0	20
1998–1999	1	1	8		10
1999–2000	0	3	8		11
2000–2001	3	3	12		18
2001–2002	0	4	9		13

[a]Hunters in permit hunts are included.
[b]Local means North Slope residents.

Table 5 Unit 26A brown bear harvest chronology by time period, 1985–2002

Regulatory year	Aug	Sep	Oct	Nov	Apr	May	June	*N*
1985–1986		6	1	0	0	5	0	12
1986–1987		13	0	0	0	7	0	20
1987–1988		19	0	0	0	3	0	22
1988–1989		17	0	0	0	14	0	31
1989–1990	1	18	1	0	0	7	0	27
1990–1991	1	18	1	0	1	10	0	31
1991–1992	0	25	2	0	3	3	0	33
1992–1993	0	18	1	0	6	4	0	29
1993–1994	0	13	1	0	4	5	0	23
1994–1995	0	12	0	0	0	8	0	20
1995–1996	0	11	2	0	2	8	0	23
1996–1997	5	11	1	0	1	2	0	20
1997–1998	11	5	0	0	1	3	0	20
1998–1999	6	4	0	0	0	0	0	10
1999–2000	3	8	0	0	0	0	0	11
2000–2001	10	6	0	0	0	2		18
2001–2002	7	6	0	0	0	0	0	13

Table 6 Unit 26A brown bear harvest[a] percent by transport method, 1985–2002.

Regulatory	Transport method for brown bear harvest														
	Airplane		Horse		Boat		Snowmachine		ORV		Walk		Unknown		Total
Year	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*	(%)	*n*
1985–1986	7	(50)	2	(14)			3	(22)			1	(7)	1	(7)	14
1986–1987	19	(95)							1	(5)					20
1987–1988	20	(92)					1	(4)	1	(4)					22
1988–1989	27	(87)			3	(10)			1	(3)					31
1989–1990	21	(78)			3	(11)	1	(4)	1	(4)					27
1990–1991	26	(84)							3	(10)			2	(6)	31
1991–1992	30	(91)					2	(6)					1	(3)	33
1992–1993	24	(83)					5	(17)							29
1993–1994	15	(65)			3	(13)	4	(18)			1	(4)			23
1994–1995	15	(75)			1	(5)	3	(15)			1	(5)			20
1995–1996	12	(52)			2	(9)	7	(30)			2	(9)			23
1996–1997	15	(75)					1	(5)	1	(5)	2	(10)	1	(5)	20
1997–1998	17	(85)			1	(5)	2	(10)							20
1998–1999	9	(90)			1	(10)									10
1999–2000	11	(100)													11
2000–2001	15	(83)			1	(6)	1	(6)			1	(5)			18
2001–2002	13	(100)													13

[a]Permit hunt harvest is included.